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THE PHILIPPINE
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VOL. X MARCH, 1915 No. 2

NEW SPECIES OF PHILIPPINE LIZARDS

By EDWARD H. TAYLOR
(Hinigaran, Occidental Negros, Negros, P. I.)

ONE PLATE

This paper is based on the collections made by the Bureau of Science during the past ten years and that made by me during the last two years. The latter collection is by far the larger and more representative. It has been made chiefly in Baguio, Mountain Province; Occidental Negros Province; and Agusan Province, Mindanao.

Most of the new species were taken at Bunauan, in the upper Agusan Valley. So far as I know, no collection has ever been made before in this locality. Hugh Cuming and A. H. Everett collected at various places along the coast of Mindanao during Spanish times; in more recent years Dr. Edgar A. Mearns and Maj. J. M. T. Partello of the United States Army collected in various parts of the interior. New species taken by the two American collectors were sent to the Smithsonian Institution, and some of them have been described by Stejneger.[1]

Bunauan is situated in a great sunken lake and swamp region, and has a remarkable herpetological fauna. More than 120 species were found there and nearly 2,000 specimens were collected; however, about 500 of these were lost in shipping the collection from the interior to the coast. In this lot a few very rare forms, including *Draco mindanensis* Stejneger, *Tropidophorus partelloi* Stejneger, and 2 others, probably new, were lost.

The faunæ of the various islands of the Philippine Archipelago are more or less distinct; that of Palawan, as shown by

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[1] *Proc. U. S. Nat. Mus.* (1908), **33**, 677; (1908), **34**, 199; (1911), **39**, 97.

Everett,[2] Boulenger,[3] Griffin,[4] and others, has more species of reptiles in common with Borneo than have the other islands. The large number of species known only from Mindanao suggests that this island has a reptilian fauna peculiar to itself. However, the knowledge of the herpetological faunæ of all the islands is very incomplete.

Fewer than 15 species and varieties of lizards have been described from the Philippine Islands since the publication of Boulenger's catalogue,[5] thirty years ago. In the present paper 14 species are described as new. These are:

Gymnodactylus agusanensis.
Gymnodactylus annulatus.
Hemidactylus luzonensis.
Ptychozoon intermedia.
Luperosaurus compresicorpus.
Lepidodactylus aureolineatus.
Emoia ruficauda.
Sphenomorphus mindanensis.
Sphenomorphus coxi.
Sphenomorphus curtirostris.
Sphenomorphus palustris.
Dasia griffini.
Tropidophorus rivularis.
Dibamus argenteus.

Dasia semicincta (Peters) has been redescribed in this paper from a splendid series of specimens. It appears to be distinct from *D. olivacea* Gray, and I doubt if the typical form of the latter occurs in the Islands. The entire collection has not been gone over, and further study will probably bring to light other new species.

Special thanks are due to Dr. Alvin J. Cox, director of the Bureau of Science, and Dr. R. P. Cowles, of the University of the Philippines, for facilitating this work; and to Mr. Artemus L. Day and Mr. S. F. Light, of the University of the Philippines, for checking identifications and assistance rendered in various other ways.

Gymnodactylus agusanensis sp. nov.

Diagnosis.—Dorsal granules intermixed with numerous large conical or trihedral tubercles, 9 or 10 irregular longitudinal rows on each side; males and females with preanal and femoral pores, those of the female much smaller; preanal pores arranged in a broadly angular series, 5 or 6 on each side; tubercles on the tail arranged in whorls.

Type.—No. R. 1686, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, June, 1913; E. H. Taylor, collector.

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[2] *Proc. Zool. Soc. London* (1889), 220.

[3] *Ann. & Mag. Nat. Hist.* (1894), VI, 14, 81.

[4] *This Journal, Sec. A* (1909), 4, 595; *Sec. D* (1911), 6, 253.

[5] Catalogue of the lizards in the British Museum (Natural History, 2d ed. London (1885), 1 and 2; (1887), 3.

Description.—Rostral large, somewhat wider than high, broadly entering the nostril and almost surrounding a quadrangular median scale above, bounded above by 2 supranasals, and 2 small roundish internasals; nostrils large, directed backward with a depressed area immediately behind; nostril surrounded by the rostral, the supranasal, and 2 postnasals; scales on the snout, especially those on the canthus rostralis, much larger than those on the occiput and neck; a depressed area between and delineating the supraorbital regions continues some distance on the snout, giving it the appearance of a "nose;" eyelid not visible around the entire eye; 10 upper labials, first largest; a row of enlarged slightly keeled scales above the upper labials; 11 lower labials; mental triangular, as broad as long, a pair of rectangular chin shields bordering on the first labial and the mental, forming a suture behind the latter; several rows of enlarged scales below the lower labials, first row largest; the remaining scales on chin and throat uniformly granular; auricular opening subtriangular; tympanum deeply sunk; body above with small granules intermingled with 18 or 20 irregular rows of enlarged, conical or slightly trihedral, tubercles of varying sizes; tubercles also on the occiput, arms, legs, and tail; those on the tail arranged in whorls, not continuing to the end of the tail; scales of the tail arranged in more or less regular transverse series; 3 or 4 enlarged tubercles on each side of the anus; a glandular row of tubercles from axilla to groin, giving the appearance of a fold in the skin; ventral scales larger, imbricate, subequal in size; preanal pores in an angular series, 5 or 6 on each side; femoral pores separated from the preanals, from 8 to 10 on each side; several enlarged rows of scales in the preanal region in front and behind the preanal pores; toes with a well-defined crook, and with well-developed transverse lamellæ below, 26 under fourth toe; distance from eye to ear equal to distance from eye to nostril, and slightly greater than the diameter of the eye; hind leg pressed forward reaches between the ear opening and the insertion of the forelegs.

Color in life.—Grayish white above with 4 or 5 enlarged, irregular, dark black-brown crossbands, strongly contrasted; tail annulated with broad black rings and narrow white interspaces; a broad dark line from behind the eye joins the dark band which crosses the shoulder; a broad light line from the angle of the mouth to the shoulder; a somewhat darker band below the white line; a narrow white line from behind the upper part of the eye to a point above the ear opening, and across the occiput; head darker than the back, with a few indistinct light markings; labials with several small white spots; abdomen and throat yellowish white, powdered with brown; arms and legs marbled with brown; toes with dark and white spots alternating.

Measurements.—Total length (extreme end of tail regenerated), 170 millimeters; snout to vent, 88; foreleg, 36; hind leg, 48; width of head, 18.

Variations.—Several other specimens taken at the same time vary more or less in the shade of brown or light color. The markings are much the same in all the specimens; in the young the colors are almost pure black and white. In 2 specimens the rostral is fused with the "interrostral." The largest specimen, a female with regenerated tail, has the following measurements: Length, 220 millimeters; snout to vent, 106; foreleg, 40; hind leg, 55; width of head, 23. The preanal and femoral pores of the female are much smaller than those of the male.

Remarks.—The occurrence of distinct pores in the female is very unusual. So far as I know this species is unique in the family with regard to this characteristic. Boulenger, in describing the family Geckonidæ, states:[6]

> Males are generally distinguished from females by a larger size, the swelling of the base of the tail, and the presence of femoral or præanal pores, which are constantly absent in the latter.

The perforations in the scales are visible to the naked eye. Examination of the underside of the skin with a microscope showed the presence of small glands with well-defined ducts. I have not ascertained whether or not the pores are functional.

It is true that in many genera of this family, while there are no pores in the females, the scales corresponding to the pore-scales of the males are enlarged and differentiated, and it is possible to ascertain to a certain degree of accuracy the number of pores in a male of a species by an examination of female specimens. In *Gecko verticillatus* the pore scales of the females have decided pits, but I have not ascertained whether or not the scales are perforated. This characteristic, I think, does not necessitate the establishing of a new genus, although it may call for a modification of the definition.

Gymnodactylus annulatus sp. nov.

Diagnosis.—Dorsal granules minute, with from 14 to 16 irregular longitudinal rows of enlarged, conical or trihedral tubercles; males with a V-shaped series of preanal pores, 3 on each side, inclosing a deep pubic groove; no femoral pores; pores wanting in the female; transverse plates under the basal phalanx large and well differentiated, 20 under the fourth toe; 12 to 14 upper labials; 11 to 12 lower labials.

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[6] Catal. Lizards Brit. Mus. 2d ed. (1885), 1, 5.

Type.—No. R. 1686–7, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, July, 1913; E. H. Taylor, collector.

Measurements.—Total length, 122 millimeters; snout to vent, 56; width of head, 13; foreleg, 18; hind leg, 25. The largest specimen taken is only 141 millimeters in length.

Remarks.—A complete description of this form is hardly necessary, since it agrees in most details with G. *agusanensis* and *G. philippinicus.* It differs from the latter in its smaller size and in having 3 instead of 6 preanal pores on each side not arranged in a parallel series as in *G. philippinicus.* The plates under the basal phalanx are enlarged and clearly differentiated.

This species is very common at Bunauan, but was not observed at Butuan near the coast. More than 40 specimens were taken, all agreeing remarkably well with the type save in the shades of coloration. They were found under rotten logs and usually in pairs. They were dark when found, but quickly became lighter in color when exposed to the sunlight.

Hemidactylus luzonensis sp. nov.

Diagnosis.—Digits free and long, with 2 rows of lamellæ; distal phalanx clawed, arising from the end of the distal portion of the toe; body with about 16 rows of strong, sharply keeled trihedral tubercles; head much flattened.

Type.—No. 1774, Bureau of Science collection; Manila, Philippine Islands.

Description of type.—Adult female; head noticeably flattened, more than twice as wide as deep, neck especially constricted; rostral squarish and upright, with a slight notch above, and a suture half the width of the scale; a supranasal with a small round internasal; nostril bordered by 2 postnasals, the first labial, the supranasal, and rostral; 11 upper labials; 10 lower labials; mental almost triangular, followed by 2 pairs of greatly enlarged chin shields, the first pair making a long suture behind the mental; a few slightly enlarged scales border the lower labials and the chin shields; head scales unequal, those on snout, especially those in front of eye, largest; a few small scattered tubercles on the occiput; ear opening moderate, vertically oval; back with from 16 to 18 irregular rows of trihedral scales, largest on the sides; tail with whorls of spiny tubercles above, below with broad transverse scales; tubercles on front legs smaller than those on hind legs; scales on chin and throat small, those on abdomen imbricate and very much larger; 8 lamellæ under longest toe; adpressed hind leg reaches beyond the elbow of adpressed foreleg; distance of ear opening and nostril from the ear, equal.

Color in formalin.—Ground color drab-gray with a few scattered brown spots; an elongate dark spot behind the eye; snout with scattered brown spots; below immaculate.

Measurements.—Total length (tail mutilated), 60 millimeters; snout to vent, 50; foreleg, 18; hind leg, 24; width of head, 11.

Remarks.—The type specimen was obtained from the Manila High School where it was being used for dissection. The abdomen has been opened and the end of the tail lost; otherwise the body is in good condition. There are no pores present, but a series of 12 differentiated preanal scales on each side probably indicates the number of pores in the male. This form is easily distinguished from *H. frenatus* by the longer inner toe, with the claw not sessile, the 8 rows of spiny tubercles on the tail, the narrowed neck, and the increased number and size of tubercles on the back. From *H. depressus* it differs in having the snout twice the diameter of the eye; the ear opening vertical and less than one third the diameter of the eye; the tail not depressed, with angular lateral edge. No other specimen having these characteristics has been seen. The type specimen was taken in Manila by a student of the High School.

Ptychozoon intermedia sp. nov.

Diagnosis.—Large scales of the dermal lobe on the side of the head equal to, or slightly smaller than, the largest abdominal scales; back with from 10 to 12 irregular longitudinal rows of flat round tubercles; tail with a narrow unsegmented terminal flap, no wider than the nearest lobes, slightly notched behind; annulations on the tail marked by lateral lobes directed somewhat backward, and a series of 4 or more enlarged scales above, much larger than the scales on the lateral lobes.

Type.—No. 1776, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, July 12, 1912; E. H. Taylor, collector.

Description.—Rostral large, rectangular, with a triangular depression in the upper part; the nostril is surrounded by the rostral, the first labial, 2 postnasals, and a rather large supranasal; latter is distinctly triangular and forms a suture with its mate behind the rostral; a large scale lies partly between the supranasals; a small roundish scale on either side of this and directly behind the supranasals, touching the superior postnasal; 11 upper labials; 10 lower labials; mental much smaller than the rostral or any of the five first lower labials, followed by two postmental scales; latter elongate, widest in the middle; on each side of the postmental a row of scales gradually diminishing in size bordering the labials; scales from the supraocular regions on the head twice as large as those on occiput; latter area with scattered small tubercles; a group of enlarged scales directly in front of the eye, back with uniform granular scales intermixed with flat roundish tubercles, 6 or 7 irregular rows on each side; scales on belly much larger than dorsal scales, or scales on the neck; on each side of the head below the auricular opening is a dermal flap, widest in front of the auricular opening and continues from near the angle of the mouth to some distance on the neck; a similar flap on the foreleg entirely bordering the limb; the dermal flap on the hind leg is wanting from the groin to the knee; on each side of the body a wide dermal flap or parachute, extending from the fore limb, where it joins the flap of the fore limb, and continuing to the groin; tail with a lateral series of small rounded lobes decreasing in size toward the tip and directed backward "saw-tooth" fashion; tail with a flap on the tip, which is scarcely wider than the nearest lobes; each segment of tail with a number of enlarged scales; on the first half these are from 8 to 6 on each segment, on the last half the number is reduced, digits not webbed to the tips; distal phalanx on inner finger and toe replaced by a flattened scale. A series of 10 differentiated preanal scales arranged in a curved line; widely separated from these is a series of differentiated femoral scales 13 to 14 in number; a large scale on each side behind anus.

Color in life.—A soft olive gray above with touches of bluish and brown; body transversed with several wavy lines of dark brown. Head more or less flecked with brown; a broad brown band from eye to shoulder; legs indistincly barred with reddish brown bands; below cream with large indistinct spots under the tail.

Measurements.—Total length, 189 millimeters; snout to vent, 92; length of head, 24; height of head, 10; width of head, 21; foreleg, 30; hind leg, 43; width of lateral flap, 8.5; length of femur, 15; greatest body width, 20.

Remarks.—This species seems to be intermediate between the two other known species of this genus. From *Ptychozoon kuhli* it differs in the absence of the wide flap at the extremity of tail, and from *P. horsfeldii* it differs in having dorsal tubercles. The type specimen is a female and has no preanal pores; however, there is a distinct series of differentiated femoral scales, 14 on a side, and an angular series of 12 preanal scales, which leads me to believe that the male when found will have a similar number of femoral and preanal pores. There are 11 upper labials and 10 lower labials; the second lower labial is largest; symphysial, small and subtriangular. Markings and coloration similar to other species.

This apparently is an extremely rare species, as it is wholly unknown to the Filipinos; were it common, there would be little doubt of its being recognized by them owing to its extraordinary appearance. Only one specimen was taken, although great efforts were made to obtain other specimens in the same and other localities. This is the only record of this genus for the Philippines.

Luperosaurus compresicorpus sp. nov.

Diagnosis.—Body elongate, compressed, with a very narrow abdominal region; digits with undivided lamellæ; fingers and toes with rudimentary webs; no dorsal tubercles; chin shields very small, undifferentiated.

Type.—No. 1781, Bureau of Science collection; Limay, Bataan Province, Luzon. Collector and date unknown.

Description of type.—Rostral large, entering the nostril, a very small suture present; 2 supranasals, the first much the larger; a depressed area immediately behind the nostrils; granules on the snout and those behind and below the angle of the mouth equal to, or larger than, dorsal granules; eye large, pupil vertical; ear opening very small; the diameter of the eye equal to its distance from the ear, less than its distance to the end of the snout; 19 or 20 upper labials, 16 lower labials; mental small; chin shields small, numerous, and irregular; a somewhat enlarged row of scales bordering the lower labials; granules on the chin and throat extremely minute; scales on the abdomen juxtaposed, cycloid, and irregular, arranged in more or less regular transverse rows, about 16 in a row; a row of differentiated preanal scales, 7 on each side, probably representing the number of preanal pores in the male; each scale with a distinct depression; an angular row of larger scales immediately behind the pore scales; distal phalanx very short with retractile claws on all save inner finger and toe; undivided lamellæ under digits, 15 or 16 under the fourth finger and an equal number under the fourth toe; lamellæ as wide at the base as at the end of digit; scales on the underside of tail very irregular in size and shape.

Color in alcohol.—Above, light cinnamon-brown, slightly darker on arms and legs; below, immaculate; tail with a slight peppering of cinnamon-brown below. No markings are in evidence.

Measurements.—Total length, 110 millimeters; snout to vent, 62; width of head, 9; greatest width of body, 7.5; foreleg, 15; hind leg, 23.

Remarks.—It is with great hesitancy that I have referred this species to the genus *Luperosaurus*, since it is unlike other species of that genus, in having a compressed body with a very narrow abdominal region. It is possible that it should be made the type of a new genus.

Lepidodactylus aureolineatus sp. nov.

Diagnosis.—Preanal and femoral pores arranged in a continuous angular series, 19 on each side; a narrow, brilliant golden line from tip of snout through eye to some distance behind eye; tail subcylindrical, with a sharp lateral edge, somewhat flattened on ventral surface.

Type.—No. 1775, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, June, 1913; E. H. Taylor, collector.

Description of type.—Rostral entering the nostril; 2 conjoined supranasals bordering the nostril above; a large postnasal; a large irregular internasal separated from the supranasals by a row of small scales; scales behind the postnasal much enlarged; mental very small; 11 upper and 10 lower labials; chin shields numerous, roundish, and subequal in size; no median groove in the forehead; tail subcylindrical, flattened below, serrated on the edge, tapering gradually.

Color in life.—Color changeable. When first taken, the back was dark brown with a series of reddish green spots beginning on the middle of the back and continuing more distinctly to the end of the tail; a narrow, bright, golden yellow line from the tip of the snout through the eye, extending to near the insertion of the front leg; tip of tongue black; belly powdered with brown. After being kept for some time, these colors changed markedly. The back became yellowish green, the spots indistinct, and blackish dots appeared about the latter; the abdomen became green, and most of the brown disappeared. When first taken, the tail was marked with reddish brown spots; on the underside brick red, powdered with brown, with indications of narrow horizontal lines. No change was observed in the color of the tail.

Measurements.—Total length, 76 millimeters; snout to vent, 34; width of head, 7; foreleg, 9; hind leg, 15.

Remarks.—This species is allied to *Lepidodactylus lugubris*, but differs in the following details: There is no groove between the eyes, there is a much larger series of pores, there is a brilliant golden line through the eye, and the first row of chin shields is smaller than the second. From *L. labialis* it differs in the presence of femoral pores. A second specimen taken at the same locality has a regenerated tail, which is peculiar in its resemblance to that of *L. planicaudus*. The tail is especially flattened, with a free, serrated, lateral edge, the sides of which are parallel for some distance, and then taper rapidly. It is a male and agrees in all other details with the type. Stejneger does not state specifically whether pores are present in his species or not, but it is probable that it agrees with *L. lugubris* in this point. A small female specimen from the type locality agrees with the type save in the presence of pores; however, there is a series of somewhat enlarged scales equal in number to the pores in the male. This form is arboreal, and specimens were taken from the tops of felled trees. Changes in colorations and markings occur very rapidly, but the golden line through the eyes is invariable. One specimen, found on a floating branch in the river, was light yellow-green without markings. Ten specimens were collected.

Emoia ruficauda sp. nov.

Diagnosis.—Lower eyelid with an undivided transparent disk; frontoparietal single; interparietal present; supranasals widely separated, bordering nostril; 5 golden yellow lines on the body; tail pale red.

Type.—No. 1778, adult female, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, June, 1912; E. H. Taylor, collector.

Description of type.—Rostral forming a straight broad suture with the frontonasal, which is much broader than long; latter in contact with the frontal; frontal wide, little more than half as long as the parietal region; frontoparietal single, interparietal small; 4 supraoculars, the second largest; 7 or 8 superciliaries; 2 large nuchals; nostril pierced between 3 nasals; 7 upper labials, fifth very large; 6 lower labials; 2 loreals; 2 superimposed preoculars; 4 much enlarged temporals, the one bordering the parietal largest; 3 chin shields behind the mental, second and third divided; 4 enlarged preanals; lamellæ under digits very numerous, close together except the distal part under which the lamellæ are broad and long; 62 under fourth toe; extended leg scarcely reaches the elbow; 26 rows of scales around the body, dorsals very large; ear opening moderate, obliquely oval.

Color in life.—Body coal black above with 5 golden yellow lines on the back; the median line begins on the snout and continues only to the sacral region; the dorsal-lateral lines begin just in front of the eyes and are lost on the tail; the lateral lines begin on the upper labials and continue to the groin; below bluish white; tail bright vermilion. Colors of young and adult the same.

Measurements.—Total length, 129 millimeters; snout to vent, 50; width of head, 12; foreleg, 15; hind leg, 22.

Remarks.—This species was fairly common in the upper Agusan Valley. It is very conspicuous and usually is seen in the tall grass near the rivers and lakes. A single specimen was observed at Butuan near the mouth of Agusan River. Several specimens from the type locality agree with the type in all essential details.

Sphenomorphus mindanensis sp. nov. Plate I, figs. 1 and 2.

Diagnosis.—Frontoparietal divided; interparietal present; lower eyelid scaly; 32 scales around the body; ear opening much smaller than eye opening; adpressed limbs barely touching.

Type.—No. R. 1690, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, September, 1912; E. H. Taylor, collector.

Description of type.—Rostral twice as broad as high; the width equal to that of the first labial; frontonasal forming a suture with the rostral and frontal; prefrontals large, separated; frontal nearly as broad as the supraocular region; frontoparietal distinct, elongate; parietals forming a suture behind a moderate interparietal; 5 supraoculars, the last much the smallest; 2 small scales inserted between the parietal and the last ocular; 8 or 9 superciliaries; nasal large, with nostril piercing it, followed by 2 or 3 loreals, the first highest; 7 upper labials, sixth much the largest; fifth low but long; a series of small suboculars, one entering some distance between the fourth and fifth supralabials; a large temporal bordering the parietal is bordered by 5 other enlarged scales; 2 enlarged preanals; 32 scale rows about the body; about 66 dorsal scales from occiput to above the vent in a longitudinal row; diameter of eye much less than distance from eye to end of snout; auricular opening distinct; tympanum more or less deeply sunk; tail very slightly compressed.

Color in life.—Above light brown with a more or less regular series of indistinct, roundish, light yellowish brown spots; lateral ground color dark brown with a few small, irregular, yellowish white spots; tail similar in color to the back with larger light spots on the sides; entire ventral surface of the body immaculate creamy white.

Measurements.—Total length, 115 millimeters; snout to vent, 48; foreleg, 10; hind leg, 15.5; width of head, 7; greatest width of body, 8.

Remarks.—This species seems closely allied to *Sphenomorphus jagori*, but differs from it in being very much smaller, in the proportional lengths of the legs being different, and in having fewer scale rows. A female containing eggs is slightly smaller than the type, but otherwise the 2 specimens are similar. This species is very rare. Only these 2 specimens were seen during a year and a half at Bunauan.

Sphenomorphus coxi sp. nov. Plate I, figs. 3 and 4.

Diagnosis.—Frontoparietal single; prefrontals not in contact; 5 supraoculars; adpressed hind legs fail to reach beyond the elbow; frontal as broad as, or slightly broader than, the supraocular region; last 3 labials with distinct yellow spots.

Type.—No. 1782, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, June, 1912; E. H. Taylor, collector.

Description of type.—Rostral moderate, high, forming a short suture with the frontonasal, which is much wider than long, and in contact with the frontal; prefrontals not widely separated; frontoparietal single, followed by a narrow interparietal; nostril pierced in a single nasal and followed by 2 loreals; 2 preoculars, superimposed; 2 narrow elongate scales above the fourth and fifth labials; 5 supraoculars followed by 4 or 5 small scales inserted between the parietal and fifth supraocular, although not entirely separating them; a very much enlarged temporal bordering the parietal, with 2 or 3 smaller temporals touching its lower edge and bordering the labials; 7 upper labials, seventh largest; 6 lower labials, last much the longest; ear opening large, nearer the foreleg than the end of the snout; several pairs of chin shields; 36 rows of scales around the body; 22 lamellæ under the fourth toe; 2 enlarged preanals; medial row of scales

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under the tail only slightly enlarged; adpressed hind leg fails to reach the adpressed elbow of the foreleg.

Color in life.—Above reddish brown with a series of about 12 darker bands across the body, indistinct above, but darker on the sides, especially on the head and neck, where the ends appear as a series of large black spots; a series of light spots on the labials, those on the last 3 labials bright yellow; tail variously barred with very narrow indefinite bars of a darker color; lower part of the tail dull purplish pink; small brown spots on the neck; belly immaculate. In young individuals the tail is pinkish.

Measurements.—Total length, 166 millimeters; snout to vent, 66; width of head, 11; width of body, 14; foreleg, 18; hind leg, 25.

Remarks.—This species superficially resembles *Sphenomorphus jagori* from which it is easily distinguished by the undivided frontoparietal. *Spenomorphus coxi* is common in the swamps and on the sides of the low mountains near Bunauan. Twenty-six specimens were collected. The species is named for Dr. Alvin J. Cox, director of the Bureau of Science.

Sphenomorphus curtirostris sp. nov.

Diagnosis.—Limbs well developed; lower eyelid scaly; tympanum distinct; no supranasals; nostril pierced in a single large nasal; snout short and blunt; frontoparietals fused in a single large plate; parietals forming a suture behind the internasal; frontonasals separated or forming a suture.

Type.—No. R. 1695, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, September 8, 1912; E. H. Taylor, collector.

Description of type.—Rostral twice as wide as high, narrowed on the ends to the width of the first labial; frontonasal twice as broad as long, forming a broad suture with the rostral; prefrontals narrowly separated, hexagonal in shape; width of the frontal equal to, or slightly larger than, the supraocular region; first 2 supraoculars touching the frontal; 4 supraoculars (5 on the left side); nasal large, bordered behind by 2 loreals, superimposed; diameter of eye equal to the distance from eye to end of snout; frontoparietal a single plate; parietals forming a long suture behind the interparietal; 7 upper labials unequal in size; 2 or 3 rows of rather large unequal scales separating the labials from the eye; a very large temporal bordering the parietal; bordered behind and below by 5 enlarged scales; 10

or 11 superciliaries; a rather large scale inserted between the prefrontal and the first supraocular; 6 lower labials; mental twice as wide as high, followed by a very large unpaired chin shield; 2 or 3 pairs of enlarged chin shields behind the latter; auricular opening large, tympanum not deeply sunk; hind leg equal to the distance from the foreleg to the snout; adpressed hind leg fails to reach the elbow of adpressed foreleg; toes somewhat compressed, with transverse, smooth lamellæ, 14 under the fourth toe; heel bordered by several enlarged scales; 40 rows of smooth scales around the body, largest on the ventral side; tail somewhat longer than head and body, slightly compressed, tapering to a sharp point.

Color in life.—Body above variegated yellowish brown, with a median row of narrow, quadrangular, chocolate-brown spots, continuing in a median line from the head to the sacral region; 2 or 3 narrow indistinct brownish lines on either side of the median spots; a wide dark brown lateral line begins on the snout, continues through the eye along the side to the hind leg, more or less dove-tailed with the lighter dorsal color covering the entire side of body; tail of somewhat lighter color with irregular darker blotches on the sides; arms and legs mottled above; ventral surface yellowish white with small brown spots, largest and most numerous under the tail.

Measurements.—Total length, 98 millimeters; snout to vent, 44; width of head, 7; foreleg, 10.5; hind leg, 15.

Remarks.—This form is closely allied to *Lygosoma decipiens* Boulenger and to *Sphenomorphus steeri* Stejneger. Specimens of both species are at hand for comparison. From the former it differs in markings, the width of the head, the size of the preanals, and in the number of scales rows; from *S. steeri* it differs chiefly in size. Several specimens of this species from the type locality agree in essential details, save that the nasals are separated in about one half of the specimens and form a suture in the others. This species is common on the low mountains near Bunauan.

Sphenomorphus palustris sp. nov.

Diagnosis.—Frontoparietal divided; 6 supraoculars, the last 2 divided; lower eyelids scaly; ear opening large, round; tympanum not deeply sunk; frontal slightly longer than the parietal region; 40 scale rows around the body; side of head barred with white.

Type.—No. 1687, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, September 16, 1912; E. H. Taylor, collector.

Description of type.—Rostral flattened above, broader than high, forming a narrow suture with the frontonasal; prefrontals nearly square, not meeting; frontal long, very narrow behind; not wider than the supraorbital region, but longer than the parietal region; frontoparietal plate divided; parietals forming a suture behind the elongated interparietal; both ends of the latter sharply pointed; supraoculars 6, the last 2 divided; nasal large, touching first 2 labials; an elongate loreal immediately behind followed by a second loreal, larger than the first; 2 enlarged preoculars; 8 upper labials, the seventh largest; 7 or 8 lower labials; mental moderate, followed by 2 chin shields, the second divided; a row of 3 enlarged suboculars under the fore part of the eye with a smaller series beginning behind these and continuing to the supraoculars behind the eye; 9 superciliaries, the first largest, the last 5 subequal; a large temporal bordering the parietal, with 2 temporals below, and 2 behind the lower end, subequal in size; 40 rows of scales around the body, laterals smallest; scales on the hind limb greatly reduced; 30 keeled lamellæ below the fourth toe; 2 somewhat enlarged transverse plates on the wrist; 2 enlarged preanals; diameter of orbit equal to length of snout; hind leg pressed forward, reaches to near the elbow of adpressed foreleg.

Color in life.—Mottled brown above with scales of darker and lighter shades; sides darker, with indistinct, irregular, bluish bars, distinguishable across the back; area in front of the arm bluish; head uniform light brown above; 3 white transverse bars on the side of the head and 3 or 4 dark-chocolate bars alternating with the white; the most distinct white line begins on the white lower eyelid and continues down through the seventh labial and is lost on the chin; tail and hind leg dark bluish to black; chin creamy white, neck with a bluish tinge; abdomen dirty brownish white.

Measurements.—Total length (tail mutilated and partly regenerated), 159 millimeters; snout to vent, 95; width of head, 16; foreleg, 24; hind leg, 35.

Remarks.—This species is related to *S. jagori*, but differs in many essential points. More than 100 specimens of the latter which were taken at Bunauan agree remarkably in scalation and coloration. Two specimens of *S. palustris* were taken several kilometers apart in the large swamp near Bunauan. These 2 specimens agree in scalation, but the coloration of the hind legs and tail of the cotype is bluish rather than black. There is no trace in this species of the distinctive markings of *S. jagori.*

Dasia griffini sp. nov. Plate I, figs. 5 and 6.

Diagnosis.—Similar to *Dasia semicincta,* but with a very much shorter head and more pointed snout; much narrower across the orbital region; the frontal longer than frontoparietal and interparietal together; scales in 26 rows around the body; scales larger than in *D. semicincta;* supranasals with a broad suture.

Type.—No. 1777, Bureau of Science collection; Taytay, Palawan; L. E. Griffin, collector.

Description of type.—Rostral normal, much wider than high; supranasals present, forming a suture; frontonasal broader than long, touching the frontal; frontal long and narrow; interparietal present, separating the parietals; frontoparietal divided; 3 nuchals present; nasal rectangular, as long as the first labial, followed by 2 loreals subequal in size; 6 or 7 superciliaries; 4 supraoculars; 7 upper labials, fifth largest; 7 lower labials; ear opening small with 1 large anterior lobule; temporals small, 3 or 4 in number; 18 lamellæ under the fourth toe; adpressed hind leg fails to meet the wrist of adpressed foreleg.

Color in alcohol.—Greenish drab above with a series of 15 transverse bars of black beginning midway on the side; tail indistinctly mottled; a lighter streak dorsolaterally along the body to base of the tail; below this line black; under part of the body immaculate light blue.

Measurements.—Total length (tail regenerated), 224 millimeters; snout to vent, 111; foreleg, 30; hind leg, 39.

Remarks.—Two other specimens were taken in Palawan which agree with the type in scales and markings, but differ somewhat in coloration. The 3 specimens are adult. This species is easily distinguished from *Dasia semicincta* by the much shorter head, the smaller number of scale rows, and the markings. This species is named for its collector, Dr. Lawrence E. Griffin, formerly professor of zoölogy in the University of the Philippines.

Dasia semicincta (Peters). Plate I, figs. 7 and 8.

Euprepes (*Titiqua*) *semicinctus* PETERS, Monatsberichte d. Acad. d. Wissensch. in Berlin (1867), 21.

Boulenger has referred this species to *Dasia olivacea* Gray. The taking of a number of specimens has confirmed my belief in the distinctness of the species. The specimens collected agree in scales and proportions, but vary in markings and coloration with the age. They agree in practically all details with Peters's description. The following is a description of a large adult male:

Description.—Rostral high; the supranasals constantly form a suture; prefrontal large, as wide as long, making a narrow suture with the frontal; prefrontals narrowly separated; frontal bordered by the first 2 supraoculars; first superciliary large, easily mistaken for a supraocular; frontoparietals and interparietal distinct, the latter separating the parietals; a pair of nuchals; nasal rectangular, as long as first labial, followed by 2 loreals, second much the larger; 2 enlarged scales under the fore part of the eye; 4 supraoculars, second largest; 7 superciliaries, first very large; 7 supralabials, fifth largest, entering the eye; 3 temporals the size of the seventh labial; mental large, followed by an unpaired chin shield and 2 large paired shields; 7 lower labials; ear opening small, nearer the foreleg than the snout; 30 rows of scales around the body; preanals somewhat enlarged; the adpressed hind leg reaches beyond the wrist of adpressed foreleg. Dorsal scales, at least those on the posterior half of back, tricarinate, occasionally quinquicarinate.

Color in life.—Owing to the extreme variation I append descriptions of specimens of various ages. Young (extreme tip of tail regenerated): Length, 132 millimeters. Body above glossy coal black with a series of brilliant orange-yellow bars from the tip of the snout to the end of the tail; 3 bars in front of eye, first on the rostral; 2 in front of eye; 2 between the eyes, having only a single representative below the eye; the sixth lies across the occipital region passing through the corners of the mouth; 2 or 3 bars across the neck; 6 on the body in front of the hind leg, with 13 much wider bars on the tail; the latter bars are more orange than yellow; legs and digits barred with canary yellow; regenerated tail brick red; below, the bars widen and loose themselves in the immaculate canary yellow of the abdomen, giving the appearance ventrally of a series of black belts, the ends of which are pointed and fail to meet. In a specimen 180 millimeters long (snout to vent, 76 millimeters), these markings are still very distinct; however, in a specimen measuring from snout to vent 92 millimeters (tail broken and regenerated), the characteristic markings of the young are scarcely distinguishable save a series of lateral bars of ocellated black and cream, scarcely traceable dorsally. These are the remains of the orange bars across the body of the young; below, bluish yellow. In a large adult (275 millimeters long) the color is olive brown above with a series of 6 lateral bars of ocellated scales, widely separated from their fellows dorsally. Traces of annulations are visible on the tail; bluish beneath. Other specimens agree in markings and coloration with these according to their ages.

Specimens of this species were collected from the tops of large felled trees. It is a retiring species and is never observed on the ground.

Tropidophorus rivularis sp. nov. Plate I, figs. 9 and 10.

Diagnosis.—Head scales feebly rugose; 4 supraoculars; no supranasals; a series of small granular scales inserted in a groove above the front labials, separating the second loreal and the anterior suboculars from the labials; 2 interparietals, the first small, followed by an elongate interparietal completely separating the parietals; sixth labial very large, below the eye.

Type.—No. 1780, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, June, 1912; E. H. Taylor, collector.

Description of type.—Rostral small, little wider than high; prefrontals forming a broad suture; frontal elongate, narrower than the supraocular region; nasal small, followed by 2 loreals, the second loreal separated from the labials by a series of granular scales; 5 labials in front of subocular, the first smallest; 8 upper labials, the sixth much the largest; mental small, equal in size to the rostral; a single unpaired chin shield behind the mental, followed by 2 paired shields lying close together, and a third pair separated by 3 elongate scales; temporals 5, slightly enlarged, none as large as the seventh labial; auricular opening large, more than half the diameter of eye; dorsal scales strongly unicarinate; a single large preanal; 30 scale rows on the body; adpressed hind leg reaches beyond the elbow of the adpressed foreleg.

Color in life.—Body above reddish brown, barred across the back with a series of indistinct, irregular cross bands, not visible on the sides; sides darker with traces of light bars of bright yellow; scales flecked with small yellow or orange spots; an orange spot behind the ear, another between the eye and the ear; head lighter brown without markings; lips and underside of throat and chin grayish blue; abdomen and underside of limbs yellowish white; under base of tail, pinkish.

Remarks.—This species is related to *T. misamisensis* Stejneger, but differs in having a double interparietal, in the character of the temporals, and in having a series of small scales in a groove above the front upper labials. These characters appear to be constant and are present in both young and adult specimens of a large series. The species is common near small mountain streams where it lives under rocks and logs, but takes to the water at once on being disturbed. A specimen was observed to swim under water in a clear pool for about 7 meters; it then took refuge under a large rock, where it remained for more than two minutes. These lizards swim by alternating movements of the arms and legs and an undulating movement of the body and tail.

Dibamus argenteus sp. nov. Plate I, figs. 11 and 12.

Diagnosis.—Snout covered with a single large rostral, pierced by the nostril; body elongate with limbs absent; 24 scale rows around the body, scales equal on body, but slightly smaller on the tail. Width of tail contained in its length five and two-thirds times.

Type.—No. 1691, Bureau of Science collection; Butuan, Agusan Province, Mindanao, May, 1913; E. H. Taylor, collector.

Description of type.—Snout covered with a single large rostral pierced by elongate nostrils; a strong suture emerges from the nostril and continues backward in an irregular line to a point opposite the eye; behind the rostral all scales imbricate; a frontal shaped like a double convex lens forms a suture with the rostral; bordered on each side by 2 oculars and behind by a somewhat larger interparietal scale, as wide as, and a little longer than, the frontal; oculars elongated, slightly smaller than the frontal; eye appears as a clouded black dot, opposite the suture in rostral; behind the ocular is a somewhat enlarged scale and below it an enlarged labial forming a suture with the rostral; mental narrow, a little longer than wide, with 2 enlarged labials on each side extending farther back than the rostral; these scales followed on each side of the head by 2 elongate scales opposite the first upper labial; rostral, mental, and lower labials noticeably thickened; 24 scale rows around the body; 250 scales in a longitudinal line from head to tail; scales around the body equal in size, slightly smaller on the tail; preanal small, but preceded by 2 or 3 large scales.

Color in life.—Light chocolate brown above and below, with irregular blotches of silvery gray, 2 of which entirely encircle the body; anal region creamy white; frontal plate silvery gray; rostral, mental, and lower labial light.

Measurements.—Total length, 125 millimeters; snout to vent, 108; tail, 17; width of head, 4.5.

Remarks.—While no specimen of *D. novæ-guineæ* is at hand for comparison, I have no doubt as to the distinctness of this species. The difference in the proportional length of the body and tail is especially evident, while the position and distinctness of the eye, the smaller size of the interparietal, and the coloration are all distinctive characters. The head is not depressed, but is the same thickness from end of snout to the neck. A single specimen was found on a small rocky hill emerging from the great swamp not far from the mouth of Agusan River. This is the first record of this family and genus in the Philippines. A second specimen has been taken on Canlaon Volcano on the Island of Negros, at an elevation of about 915 meters.

ILLUSTRATIONS

[Drawings by T. Espinosa]

PLATE I

FIGS. 1 and 2. *Sphenomorphus mindanensis* sp. nov. ×2. From the type, No. 1690.
3 and 4. *Sphenomorphus coxi* sp. nov. ×1. From the type, No. 1782.
5 and 6. *Dasia griffini* sp. nov. ×1. From the type, No. 1777.
7 and 8. *Dasia semicincta* Peters. ×1.
9 and 10. *Tropidophorus rivularis* sp. nov. ×1. From the type, No. 1780.
11 and 12. *Dibamus argenteus* sp. nov. Much enlarged. From the type, No. 1691.

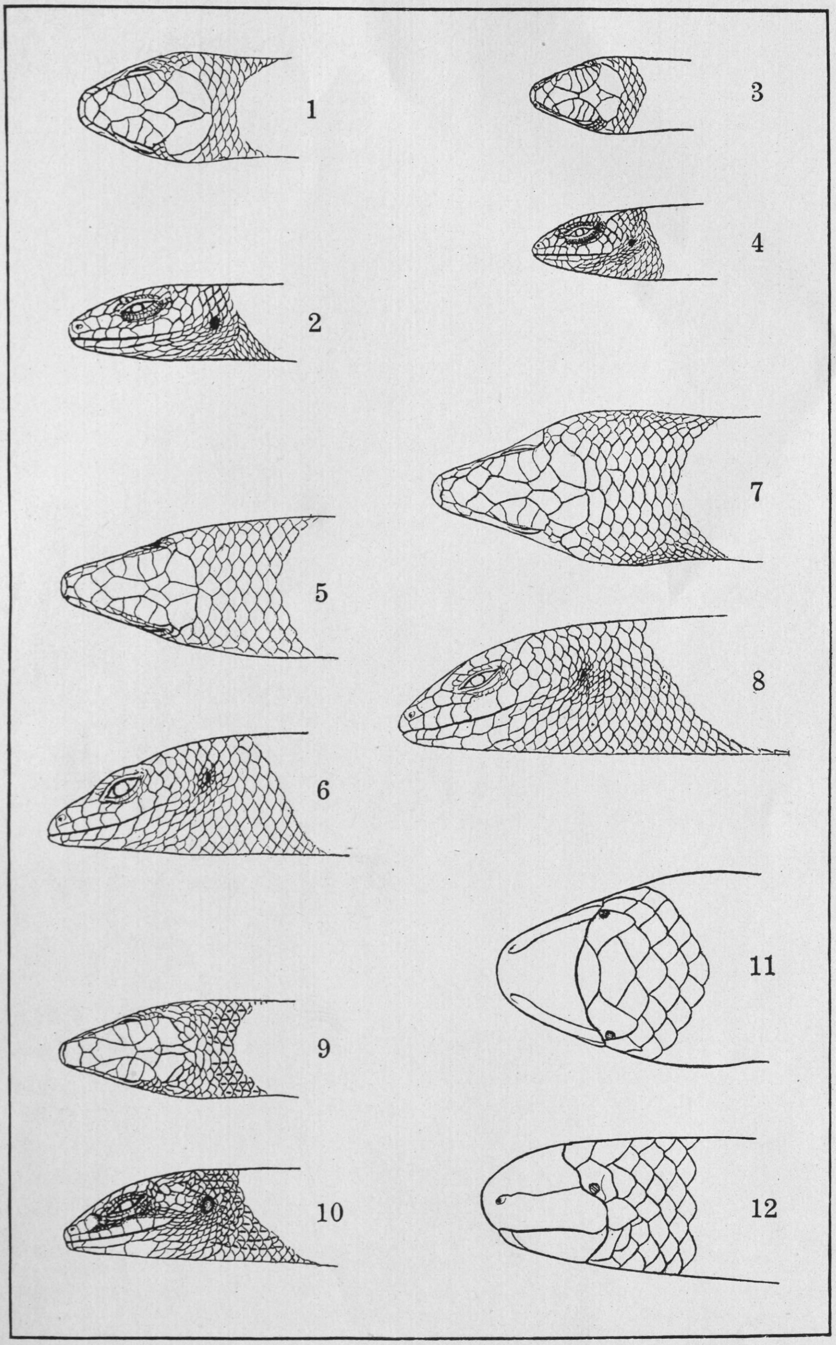

PLATE I.

Figs. 1 and 2. Sphenomorphus mindanensis sp. nov. 3 and 4. Sphenomorphus coxi sp. nov. 5 and 6. Dasia griffini sp. nov. 7 and 8. Dasia semicincta Peters. 9 and 10. Tropidophorus rivularis sp. nov. 11 and 12. Dibamus argenteus sp. nov.

THE EGGS OF ASCARIS LUMBRICOIDES

By Lawrence D. Wharton

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In the microscopical examination of fæces for the eggs of *Ascaris lumbricoides* a number of atypical forms of eggs are often found of which the origin has not been explained. In numerous attempts to account for their presence, different authors have even suggested that the most atypical forms are produced by another species of worm. While working in the laboratory with live *Ascaris*, I have been able to obtain eggs in large numbers, under conditions which serve to throw considerable light on the production of these atypical forms. In this paper I shall describe the methods by which I have obtained eggs from living *Ascaris*, the various forms of eggs which are found in fæces and which may be obtained in the laboratory, and the experiments in which the atypical eggs have been produced.

I have been able very frequently to obtain living *Ascaris lumbricoides* from autopsies at the city morgue, through the kindness of Dr. B. C. Crowell, of the College of Medicine and Surgery. When the worms are placed immediately in Kronecker's solution,[1] they live for from five to twelve days at the temperature of the laboratory (25° to 35° C.), and the females continue to lay eggs for some days. To obtain eggs for experiment, healthy-looking, adult females were placed, separately, in glass dishes of the solution, and the dishes were covered with glass plates. The solution was changed each day, and a record was kept of the kind of eggs laid by each individual. No attempt was made to keep them in the dark during the daytime, and I found that the eggs were generally, although not always, laid at night. To make sure that the females used in the experiments carried fertilized eggs, they were generally taken from a host harboring both male and female worms. In some cases a male was kept in the same dish with a female, but this did not seem to influence the number or condition of the eggs laid.

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[1] Common salt, 6 grams; caustic soda, 0.06 gram; distilled water, 1,000 cubic centimeters. I do not consider this solution a very good medium for *Ascaris*, but it is the most satisfactory one of which I know. If placed in water, the worm absorbs so much that in about twenty-four hours the body wall bursts and the *Ascaris* dies.

Typical eggs of *Ascaris lumbricoides* are more or less oval in form. They average about 70 micra in length and 50 micra in thickness, although the variation in size and curvature is rather great. The egg consists of a central mass of protoplasm and yolk with a very thin vitelline membrane, surrounded by a thick transparent shell consisting of an inner layer of chitin and an outer layer of some albuminous material. The chitinous inner shell is made up of two parts, a thin, tough, very refractive layer, and a thicker, more brittle, outer layer which often shows very delicate striations. The egg does not entirely fill the shell, but forms a round ball in the center with a clear space at each end. The polar bodies often may be seen in one of these clear spaces in a newly laid egg.

On the outside of the chitinous shell is a thick layer of albuminous material, which is raised all over the surface into small, round, blunt protuberances, producing a very characteristic mammillated appearance. This layer is colorless in eggs laid in the laboratory, but in the fæces it generally is colored by the bile pigment. It adheres very tightly to the chitinous part of the shell, and I have never been able to remove it without destroying the egg. When the eggs are first laid, this outer layer is sometimes very soft and sticky, and this fact accounts for one of the commonest atypical forms which is found in the fæces. This is the form in which the mammillations are missing and the albuminous layer is denser than in the typical mammillated form. This condition may be produced by shaking together freshly laid mammillated eggs or by rolling them about between two smooth surfaces while they are still soft. The mammillations are smoothed down, and the layer becomes more compact. It seems very reasonable to suppose that the same thing may occur sometimes in the intestine, particularly if the eggs be laid a little prematurely.

Another atypical form which is often found in fæces differs from the typical eggs in that the outer albuminous layer of the shell is entirely absent, and the surface, which is formed by the outer chitinous layer, is perfectly smooth. Eggs of this kind are the most difficult to diagnose, as they are easily mistaken for the eggs of other forms of worms, and there even has been some doubt as to whether they were the eggs of *A. lumbricoides* or of some closely related species. It is suggested by some authors that these eggs are produced by the shelling off of the albuminous layer in the intestine by pressure or by the rubbing of the eggs against one another. I have tried to remove this layer from the eggs by various mechanical means, but have never succeeded. Shaking or rubbing the eggs together or rolling them about between two surfaces may smooth down the mammillations, but it never removes the albuminous layer from around the shell. The eggs may be broken, but the two layers of the shell remain tightly attached, so I feel safe in saying that their condition is not due to pressure.

This form of egg is also often obtained when eggs are laid in Kronecker's solution under certain conditions. Table I is a record of the eggs laid by 56 individuals of *Ascaris lumbricoides* kept in the solution in the laboratory. This table shows the conditions under which the atypical eggs are laid. Of the 56 worms, 13 did not lay eggs. Two, Nos. 19 and 38, laid only unfertilized eggs. All the others laid at least once, and the majority laid several times. In all cases except Nos. 26, 27, 28, and 29 from autopsy 3136 and No. 34 from autopsy 3137 the first laying consisted of typical 2-layered mammillated eggs. In the succeeding layings the outer albuminous layer became much thinner and less typical, and in the majority of cases where laying continued for several days it disappeared entirely, and only eggs with a smooth surface, without the albuminous layer

TABLE I.—*Eggs laid by Ascaris lumbricoides in Kronecker's solution.*

No. in series.	Autopsy No. of host.	Date obtained.	Day.											
			1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1	3104	Apr. 4	×	×	×	O	×—	—	U—	O	D	------	------	------
2	3104	----do----	×	O	O	UY	UY	UY	O	O	D	------	------	------
3	3104	----do----	×	O	O	O	O	O	×—	O	D	------	------	------
4	3104	----do----	×	O	O	×—	D	------	------	------	------	------	------	------
5	3104	----do----	×	O	×—	O	D	------	------	------	------	------	------	------
6	3110	Apr. 7	O	O	O	O	D	------	------	------	------	------	------	------
7	3113	----do----	×	×	×	×	O	×	D	------	------	------	------	------
8	3113	----do----	×	O	×	O	O	O	D	------	------	------	------	------
9	3113	----do----	×	×	×	O	O	×	D	------	------	------	------	------
10	3113	----do----	×	×	×	K	------	------	------	------	------	------	------	------
11	3113	----do----	O	×	O	×	O	×—	D	------	------	------	------	------
12	3113	----do----	×	O	×	×	O	D	------	------	------	------	------	------
[a]13	3114	Apr. 8	O	×	×	O	×—	O	D	------	------	------	------	------
[a]14	3114	----do----	O	×	×	O	×	O	O	D	------	------	------	------
[a]15	3114	----do----	O	O	×	O	×—	O	O	D	------	------	------	------
16	3118	Apr. 13	O	O	O	D	------	------	------	------	------	------	------	------
17	3118	----do----	O	O	D	------	------	------	------	------	------	------	------	------
18	3118	----do----	O	O	O	O	O	O	D	------	------	------	------	------
[b]19	3125	Apr. 14	O	O	O	O	O	O	O	U—	O	D	------	------

TABLE I.—*Eggs laid by Ascaris lumbricoides in Kronecker's solution*—Contd.

No. in series.	Autopsy No. of host.	Date obtained.	Day.											
			1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
20	3126	Apr. 15	×	×	O	O	×—	O	—	O	O	O	D	......
21	3126	do	O	O	O	O	D	......	......	......	......	......	......	......
22	3126	do	O	×	O	O	D	......	......	......	......	......	......	......
23	3126	do	O	O	O	O	×	O	D	......	......	......	......	......
24	3126	do	O	O	O	O	D	......	......	......	......	......	......	......
[b]25	3131	Apr. 17	O	O	O	O	D	......	......	......	......	......	......	......
26	3136	Apr. 20	O	O	O	O	D	......	......	......	......	......	......	......
27	3136	do	O	×—	O	K	......	......	......	......	......	......	......	......
28	3136	do	O	O	×—	×—	D	......	......	......	......	......	......	......
29	3136	do	—	O	O	D	......	......	......	......	......	......	......	......
30	3136	do	O	×	×—	—	D	......	......	......	......	......	......	......
31	3137	Apr. 22	O	×	×	K	......	......	......	......	......	......	......	......
32	3137	do	O	×	×	O	—	O	O	O	O	O	D	......
33	3137	do	×	K	......	......	......	......	......	......	......	......	......	......
34	3137	do	O	×—	×—	K	......	......	......	......	......	......	......	......
35	3137	do	O	O	O	O	×—	O	×	O	O	—	K	......
36	3137	do	O	×	O	O	×	O	×—	O	O	×—	—	K
[a]37	3137	do	×	×—	×—	K	......	......	......	......	......	......	......	......
[a]38	3139	Apr. 24	U—	O	O	O	O	O	O	D	......	......	......	......
[a]39	3139	do	×	O	×—	D	......	......	......	......	......	......	......	......
[a]40	3139	do	O	×	O	O	O	O	O	D	......	......	......	......
[a]41	3139	do	O	K	......	......	......	......	......	......	......	......	......	......
[a]42	3139	do	O	O	O	O	×	O	O	D	......	......	......	......
[a]43	3139	do	×	O	×	O	—	O	O	D	......	......	......	......
[a]44	3139	do	×	O	×	O	×	O	O	D	......	......	......	......
[a]45	3139	do	O	O	×	O	O	O	O	O	D	......	......	......
[a]46	3139	do	×	O	O	O	O	O	O	O	—	K	......	......
[a]47	3139	do	×	O	×	O	×	O	O	×—	—	—	—	D
[a]48	3139	do	O	×	O	O	O	O	O	O	D	......	......	......
49	3145	Apr. 25	O	O	O	O	O	O	O	K	......	......	......	......
50	3145	do	O	O	O	O	O	O	O	D	......	......	......	......
51	3145	do	O	×	O	×	O	O	×	K	......	......	......	......
52	3145	do	×	O	O	×	O	—	O	D	......	......	......	......
53	3145	do	O	O	O	O	O	O	D	......	......	......	......	......
54	3145	do	O	O	O	O	O	O	O	D	......	......	......	......
[a]55	3154	Apr. 29	O	O	O	×	O	O	D	......	......	......	......	......
56	3154	do	O	O	O	O	×	×—	D	......	......	......	......	......

[a] Male kept in the salt solution with the female.

[b] Found alone in the intestine of the host.

O No eggs laid.

U Unfertilized eggs only laid.

× Typical mammillated eggs.

Y Eggs on which the albuminous layer is very thin and in some cases lacking.

— All eggs without albuminous layer of shell.

NOTE.—In many cases after the first or second layings part of the eggs laid were unfertilized. No record is made of unfertilized eggs except in those cases where they were all unfertilized.

D Died.

K Killed.

resulted. I kept these eggs from a number of different individuals and found that they developed in the same manner and in the same length of time as the typical eggs. In fact, it was impossible to find any difference between the two kinds of eggs except the total absence of the albuminous layer in the second form. As this layer of the shell is produced only in the anterior part of the uterus after the chitinous layer has been deposited, its absence has no effect on the protoplasm of the egg. The absence of the albumen from the surface must be due to some physiological condition which prevents the formation and deposition of the required substance by the uterine glands. What this condition is I am unable to state. That it is not due solely to a lack of nutritive material in the solution is indicated by the fact that eggs of this form are sometimes found in the fæces of perfectly healthy well-nourished persons, while in poorly nourished and diseased persons the eggs may all have the typical mammillated layer of shell. Although this experiment fails to show why these atypical eggs are produced, it conclusively shows that they are produced by *Ascaris lumbricoides*, if the proper conditions arise, and that their presence in the fæces is not due to the presence of any other species of worm or any particular variety of *Ascaris lumbricoides*.

In addition to the above-mentioned forms, unfertilized eggs are also frequently found. These may be distinguished readily by the fact that the protoplasm of the egg is not surrounded by a vitelline membrane and completely fills the shell. It is also much more vacuolated than in the fertilized eggs. The shell of the unfertilized eggs may present any of the conditions found in the fertilized eggs. In addition, both layers of the shell are sometimes absent in the unfertilized eggs laid in Kronecker's solution, but eggs in this condition are not likely to be found in fæces as they would be destroyed very quickly by the juices of the intestine or by the pressure of its contents and would not succeed in passing out unbroken.

ZUR STAPHYLINIDENFAUNA DER PHILIPPINEN: VI. BEITRAG ZUR KENNTNIS DER INDO-MALAYISCHEN FAUNA

Von MAX BERNHAUER
(Horn, Nieder Oesterreich)

Herr Professor C. F. Baker, der unermüdliche Erforscher der Philippinen, hatte die Freundlichkeit abermals eine Partie von ihm gesammelter Staphyliniden zur Bearbeitung einzusenden. In dem ich demselben hiefür meinen besten Dank sage, übergebe ich die in dem hochinteressanten Material vorgefundenen Neuheiten der öffentlichkeit.

Osorius bakeri sp. nov.

Unter den Arten mit nicht ausgebuchteten Halsschildseiten durch den äusserst dicht und gleichmässig längsgestreiften Kopf und die zwei seitlichen fast xapfenförmigen Fortsätze der Stirn leicht zu erkennen. Von der normalen glänzend pechschwarzen *Osorius*-Farbe, die Fühler, Taster und Beine rostrot. Kopf etwas schmäler als der Halsschild, ausser der glatten Scheitelpartie mit scharfen, kielförmigen, die ganze Länge einnehmenden Längsstrichen sehr dicht besetzt, nur ober der Fühlerwurzel in geringerer Ausdehnung geglättet, vorn tief bogig asymetrisch ausgeschnitten, die Seiten in lange, breite, spitzwinkelige Fortsätze ausgezogen, von denen der rechte länger, weniger breit und schärfer spitzwinkelig ist. Halsschild in der vorderen Hälfte breiter als die Flügeldecken, nach rückwärts geradlinig verengt, wenig breiter als lang, vor den Hinterecken mit breit abgesetzter Seitenrandkehle, ziemlich fein und spärlich, unregelmässig punktiert, zu beiden Seiten der unpunktierten Mittelzone mit je einer feinen Dorsalpunktreihe. Flügeldecken etwas länger als der Halsschild, ohne deutliche Punktierung, nur mit wenigen flachen undeutlichen Punkten besetzt. Hinterleib ziemlich fein und spärlich punktiert und mit einzelnen sehr fein eingegrabenen Querstricheln.

Länge, 6–6.25 mm.

LUZON, Laguna, Mount Maquiling.

Osorius maquilinganus sp. nov.

Mit dem vorigen sehr nahe verwandt, halb so klein, der Kopf weniger dicht und weniger ausgedehnt längsgestrichelt, der

Höcker über der Fühlerwurzel in grösserer Ausdehnung geglättet, neben demselben nicht gestrichelt, die Stirnfortsätze sind schmäler und erscheinen dadurch länger. Der Halsschild ist vor den Hinterecken nicht so stark und breit abgesetzt, die Seitenrandkehle viel schmäler, die Punktierung ist weniger spärlich. Auf den Flügeldecken ist die Skulptur auch weniger undeutlich und weniger spärlich.

Länge, 5.75 mm.

LUZON, Laguna, Mount Maquiling (1 Exemplar).

Osorius philippinus sp. nov.

Unter den Arten mit geradlinigen Seiten durch die Färbung und die Skulptur des Kopfes und Halsschildes gleich ausgezeichnet und kaum mit einer anderen Art zu verwechseln. Pechschwarz, Halsschild, Abdomen, der Vorderrand des Kopfes, die Fühler, Taster und Beine rötlichgelb, glänzend. Der Kopf ist mit Ausnahme der glatten hinteren mittleren Stirnpartie und der Fühlerhöckerchen sehr fein aber deutlich chagriniert, nur matt glänzend, mässig dicht mit sehr feinen, nicht zu langen Längsstrichelchen in der Partie zwischen den Augen. Halsschild wenig breiter als lang, nach rückwärts von den Vorderecken angefangen in fast gerader Linie verengt, verkehrt trapezförmig, mit schmal abgesetzter Seitenrandkehle, sehr fein und spärlich punktiert, in den Dorsalreihen in der Mitte mit je einem schmalen Längseindruck, in welchem einige grobe Punkte eingestochen sind. Flügeldecken kaum länger als der Halsschild, fast quadratisch, sehr undeutlich und spärlich skulptiert. Hinterleib fein und spärlich punktiert, überdies längsgestrichelt.

Länge, 4 mm.

LUZON, Laguna, Mount Maquiling.

Osorius luzonicus sp. nov.

In die Nähe des *Osorius cribrum* Fauv. gehörig, jedoch nur höchstens ein Fünftel so gross, die Stirn ist vorn nicht wie bei diesem in der Mitte zahnförmig vorgezogen, sondern gerade abgestutzt, die Strichelung ist feiner und weitläufiger. Der Halsschild ist dem des *O. cribrum* sehr ähnlich gebildet, die Punktierung aber ist feiner und weniger tuberkelartig. Endlich sind die Flügeldecken etwas weitläufiger punktiert.

Länge, 3.75 mm.

LUZON, Laguna, Mount Maquiling.

Osorius minutus sp. nov.

In der Skulptur des Kopfes mit *Osorius minutissimus* Bernh. fast übereinstimmend, durch mehr als doppelt so grosse Gestalt, breiteren und kürzeren Halsschild, viel breitläufiger und feiner punktierten Halsschild und längere weitläufiger skulptierte, glänzendere Flügeldecken sofort zu unterscheiden. Der Halsschild ist deutlich breiter als lang, sehr fein und weitläufig punktiert, die glatte Mittellinie nur mässig scharf abgesetzt. Die Flügeldecken sind der Länge nach lang-gerunzelt, an den Seiten in der Schulter beginnend in eine stumpfe Längsfalte aufgeworfen.

Länge, 2.75 mm.

LUZON, Laguna, Mount Maquiling.

Stenus (Hypostenus) smaragdinus sp. nov.

Eine reizende durch die Farbe sehr ausgezeichnete neue Art. Schwarz, die ganze Oberseite hellgrün erzglänzend, die ganzen Fühler, Taster und Beine licht rötlichgelb. Kopf sehr breit, fast breiter als die Flügeldecken, mit erloschenen Stirnfurchen, grob und mässig dicht punktiert, mit 3 kurzen geglätteten Längserhabenheiten in der Mitte und ober den Fühlerwurzeln. Fühler kurz, die Keulenglieder wenig länger als breit. Halsschild viel schmäler als die Flügeldecken, um ein Drittel länger als breit, an den Seiten gleichmässig gerundet, oben ziemlich gleichmässig gerundet ohne Eindrücke, grob und nicht allzu dicht, gleichmässig punktiert, glänzend. Flügeldecken kürzer als der Halsschild, an den Schultern abgerundet, nach rückwärts schwach verengt, noch gröber und etwas weitläufiger punktiert als der Halsschild, glänzend. Abdomen glänzend, stark, an der Basis der Tergite dicht, in der Apikalhälfte weitläufig, am 7. Tergit ziemlich gleichmässig und ziemlich dicht punktiert.

Länge, 3.75 mm.

LUZON, Laguna, Los Baños.

Stenus tropicus sp. nov.

♀: Ebenfalls in die *Hypostenus*-Gruppe gehörig, durch die Färbung, den breiten Kopf und die gleichmässig dichte Punktierung des ganzen Körpers recht ausgezeichnet. Tiefschwarz, mässig glänzend, die Fühler bis auf die schwärzliche Spitze, die Taster und die ganzen Beine rötlichgelb. Kopf fast breiter als die Flügeldecken, mit sehr grossen Augen, ausgehöhlt ohne Stirnfurchen, ober den Fühlerwurzeln mit einer geglätteten kurzen Längserhabenheit, grob und dicht, gleichmässig punktiert. Halsschild viel schmäler als die Flügeldecken, etwas länger als breit, an den Seiten hinten schwach ausgeschweift, etwas vor der Mitte am breitesten, ziemlich stark gerundet, oben gleichmässig gewölbt, dicht und grob, gleichmässig punktiert, die Zwischenräume scharf abgesetzt. Flügeldecken kürzer als der Halsschild, quer-rechteckig, gröber als der Halsschild, aber weitläufiger und runzeliger punktiert. Hinterleib walzenförmig, nur an den Seiten des 3., 7. und 8. Tergites gerandet, weniger grob und weniger dicht als der Vorderkörper punktiert, glänzender. Die Punktierung ist ziemlich gleichmässig.

Länge, 4.5 mm.

LUZON, Laguna, Mount Maquiling (1 Exemplar).

Stenus (Hypostenus) maquilinganus sp. nov.

♂: In die Nähe des *Stenus bispinus* Motsch. zu stellen, fast von der gleichen Färbung, jedoch durch dreimal grössere Gestalt, viel längere Flügeldecken, viel weitläufigere Punktierung des ganzen Körpers, längeren Halsschild u. s. w. auf den ersten Blick zu unterscheiden. Schwarz, mit gedämpftem Glanze, die Fühler mit Ausnahme der schwach gebräunten Keule und die Taster rötlichgelb, die ganzen Beine weisslichgelb. Kopf breiter als der Halsschild, aber schmäler als die Flügeldecken, ziemlich flach mit schwach angedeuteten Stirnfurchen, ober den Fühlerwurzeln und hinten längs der Mitte geglättet, diese Stellen jedoch wenig vortretend, sonst mässig stark und weitläufig punktiert. Fühler lang, die Glieder der Keule gut doppelt so lang als breit. Halsschild viel schmäler als die Flügeldecken, um ein Drittel länger als breit, cylindrisch, in der Mitte nur schwach erweitert, oben an den Seiten schwach schräg eingedrückt, mässig stark und mässig dicht punktiert. Flügeldecken länger als der Halsschild, ziemlich quadratisch, gröber als dieser und nur wenig dicht, hinten feiner und weitläufiger punktiert. Hinterleib nur in den Basalfurchen der vorderen Tergite stark und dicht punktiert, sonst nahezu glatt, nur mit äusserst zarten Pünktchen vereinzelt besetzt.

Länge, 5.25 mm.

LUZON, Laguna, Mount Maquiling (1 Exemplar).

Beim ♂ ist das 6. Sternit sehr breit und sehr tief dreieckig ausgeschnitten, der Ausschnitt fast bis zur Basis reichend, das 5. Sternit ist der ganzen Länge nach dreieckig dicht goldgelb behaart, die vorhergehenden bis zum ersten mehr oder weniger der Länge nach eingedrückt, die Eindrücke dicht behaart, der Hinterrand des 4. und 3. Sternites schwach bogig ausgerandet.

Astenus viperinus sp. nov.

Von der Färbung des *Astenus filiformis* Latr. durch die eigentümliche Gestalt des langgestreckten Kopfes sehr ausgezeichnet.

Schwarz, matt, der Hinterleib glänzend, der Hinterrand der Flügeldecken breit gelb gesäumt, die gelbe Farbe neben der Naht nach vorn verlängert, die Fühler und Taster rötlichgelb, die Beine hellgelb. Kopf etwas schmäler als der Halsschild, fast um die Hälfte länger als breit, hinter den Augen vollständig geradlinig verengt, so dass die hintere Hälfte des Kopfes die Gestalt eines verkehrten Trapezes erhält, die Hinterecken verhaltnismässig schmal verrundet. Die Punktierung ähnlich wie bei *Astenus filiformis.* Halsschild etwas schmäler als die Flügeldecken, fast um die Hälfte breiter als lang, eiförmig, ähnlich wie bei *A. filiformis* punktiert. Flügeldecken etwas länger als der Halsschild, weniger dicht als bei *A. filiformis* punktiert, mit stärkerem Glanze. Hinterleib ziemlich kräftig und mässig dicht, weitläufiger als bei *A. cribrellus* Baudi punktiert, stark glänzend.

Länge, 4.5 mm.

LUZON, Laguna, Los Baños.

Beim ♂ ist das 6. Sternit schmal und tief ausgeschnitten, der Ausschnitt an den Rändern schmal geglättet, das 5. ist der ganzen Länge nach breit niedergedrückt, am Hinterrand breit und seicht ausgerandet und dicht krenuliert, das 4. ist ebenfalls, aber in geringerer Ausdehnung niedergedrückt und vor der Mitte des Hinterrandes breit geglättet.

Astenus philippinus sp. nov.

Von der vorhergehenden Art durch etwas kleinere Gestalt, viel kürzeren Kopf, der aber immer noch länger als bei *Astenus filiformis* ist, kürzeren Halsschild, kürzere Flügeldecken, nicht nach vorn gezogene gelbe Färbung des Hinterrandes derselben und viel kürzere Fühler unterschieden.

Der Kopf ist deutlich länger als breit, die Fühler sind kurz, die vorletzten Glieder kaum länger als breit, das Endglied ziemlich breit, an der Spitze schief abgestutzt. Der Halsschild ist kurz oval, an den Seiten mit 2 Seitenborsten. Die Flügeldecken sind wenig länger als der Halsschild, nicht allzu dicht punktiert, ziemlich glänzend.

Länge, 3.75 mm.

LUZON, Laguna, Los Baños.

Medon philippinus sp. nov.

Diese Art ist dem *Medon granulicollis* Bernh. so nahe verwandt und in der Bildung der einzelnen Körperteile so ähnlich, dass es genügt die wenigen, aber immerhin markanten Unterscheidungsmerkmale anzugeben. Die Färbung ist im allgemeinen dunkler, pechschwarz, die Flügeldecken an der Basis mehr oder minder rotbraun, der Spitzenrand hell rötlichgelb, mit langen gelben Haaren dicht bekleidet, bei unausgefärbteren Exemplaren tritt die rostbraune Färbung mehr oder minder hervor. Der Kopf ist breiter, nach hinten nicht wie bei *M. granulicollis* Bernh. schwach erweitert, sondern ganz parallelseitig. Die Punktierung des Kopfes und Halsschildes ist viel dichter und runzeliger ineinanderfliessend, während bei *M. granulicollis* die einzelnen Körner von einander deutlich gesondert sind.

Länge, 3.5–4 mm.

LUZON, Laguna, Los Baños.

Beim ♂ ist das schmale 6. Sternit schwach ausgerandet, die übrigen Sternite einfach.

Staphylinus (Nesiolinus) bakeri sp. nov.

Eine durch die prächtige Farbe sehr ausgezeichnete Art.

Schwarz, Kopf, Halsschild und Flügeldecken lebhaft Kornblumenblau, das Endglied der schwarzen Fühler und die Spitze des vorletzten, sowie die Beine weissgelb, die obere Kante der Schenkel bis auf die Spitze pechschwarz, die Stacheln der Schiener schwarz, die Tarsen mit Ausnahme des ersten Tarsengliedes der Mittel- und Hintertarsen rötlichschwarz. Kopf und Halsschild ziemlich glänzend, sehr grob und ziemlich dicht nabelig punktiert, silberweiss behaart, überdies mit längeren dünneren schwarzen Härchen und an den Seiten mit langen schwarzen Borsten besetzt. Die Flügeldecken matt chagriniert und überdies fein und weitläufig punktiert, lang und wenig dicht schwarz behaart, mit einer silberweissen Querbinde vor der Mitte, am Hinterrande dicht mit langen silberweissen Haaren bekleidet. Hinterleib nach rückwärts verengt, ziemlich glänzend, fein und weitläufig punktiert und dünn schwarz behaart und stellenweise, namentlich in der Mitte und an den Seiten, mit ziemlich dichtem silberweissem Toment besetzt. Die Hinterbrust ebenfalls silberweiss behaart. Der Kopf ist um ein gutes Stück schmäler als der Halsschild, um ein Viertel breiter als lang, an den Seiten fast nach rückwärts verengt, die Schläfen hinter den Augen ein Drittel so lang als deren Längsdurchmesser; die Oberseite ist längs der Mitte schmal geglättet. Halsschild etwas schmäler als die Flügeldecken, der Hinterrand und Seitenrand in kontinuirlichen Bogen gerundet, nach vorn deutlich verengt.

Länge, 11 mm.

LUZON, Laguna, Mount Maquiling.

Beim ♂ ist das 6. Sternit breit und ziemlich tief ausgeschnitten, der Ausschnitt im Grunde gerundet, das 5. ist leicht ausgerandet.

Diese Art und die Folgende besitzen eine Anzahl von Merkmalen, die die Aufstellung eines neuen Subgenus notwendig machen, für welches ich den Namen *Nesiolinus* wähle.

Diese Untergattung zeichnet sich unter den Arten mit rudimentären Epimeren durch den nach hinten schwach verengten Kopf und den nach vorn verengten Halsschild aus. Die Fühlerbildung ist der des Subgenus *Trichoderma* gleich. Der Fortsatz der Mittelbrust, der bei den vorliegenden Stücken nicht deutlich sichtbar ist, scheint mir die Mitte zwischen *Trichoderma* und *Abemus* zu halten.

Staphylinus (Nesiolinus) pulcherrimus sp. nov.

♀ : Dem vorhergehenden an Körpergestalt und Punktierung des Vorderkörpers recht ähnlich, jedoch kleiner, ganz anders gefärbt und behaart, überdies durch matten Hinterleib ausgezeichnet.

Schwarz, matt, der Halsschild, eine Schultermakel auf den Flügeldecken und die schmale Hinterleibspitze gelbrot, die 4 ersten und das letzte Glied der schwarzen Fühler und die Brust rötlichgelb, die Hinterbrust etwas angedunkelt, die Beine einfärbig hellgelb. Die rotgelbe Schultermakel setzt sich bis zum Aussenrande der Flügeldecken fort. Die Epipleuren und der hinten mit ihnen verbundene Hinterrand der Flügeldecken sind lichtgelb gefärbt; diese Färbung erweitert sich gegen die Hinterecken. Der gelb gefärbte Hinterrand der Flügeldecken ist mit goldgelben zottigen Haaren dicht bekleidet. Der Hinterleib ist dicht schwarz behaart, die Seiten der Tergite und die Apicalhälfte des 6. Tergites ist dicht licht goldgelb tomentiert.

Länge, 9 mm.

LUZON, Laguna, Mount Maquiling (1 Exemplar).

Coproporus philippinus sp. nov.

Dem *Coproporus brunnicollis* Motsch. (*punctipennis* Kr.) sehr nahe verwandt, ganz von dem Habitus und der Färbung desselben, jedoch halb so klein und durch viel feiner und dichter punktierte Flügeldecken sofort von ihm zu unterscheiden.

Die Flügeldecken sind wie bei *C. brunnicollis* Motsch. an den Seiten flach ausgebreitet und weder eingedrückt noch gefurcht. Der Körper ist hochgewölbt, Kopf und Halsschild spiegelblank.

Länge, fast 2 mm. (bei eingezogenem Hinterleibe).

LUZON, Laguna, Los Baños (1 Exemplar).

Genus **PSEUDOSILUSA** novum

Im Habitus einer *Silusa* recht ähnlich jedoch infolge der Mundbildung in die nächste Nähe von *Phymatura* zu verweisen.

Die Gestalt der Zunge, der Lippen und Kiefertaster, sowie der Kieferladen ist von der letztgenannten Gattung kaum verschieden; die neue Gattung unterscheidet sich aber ausser dem *Silusa*-artigen Habitus sehr markant von *Phymatura* durch ungekielte Mittelbrust. Habituell auch der Gattung *Diestota* Muls. et Rey verwandt, von dieser aber durch den rückwärts zugespitzten Fortsatz der Mittelbrust verschieden. Ob in der Bildung der Zunge auch ein Unterschied zu *Diestota* vorhanden ist kann ich nicht beurteilen, da in der Rey'schen Beschreibung[1] von der Zungenbildung keine Erwähnung geschieht. Bei dem neuen Genus ist die Zunge, wie bei *Bolitochara*, lang und schmal an der Spitze gespalten und bis zur Spitze des 2. Lippentastergliedes reichend. Über die Lebensweise ist bisher nichts bekannt; die vorläufig einzige Art der Gattung wurde von Herrn Prof. Baker auf den Philippinen entdeckt.

Pseudosilusa trifoveolata sp. nov.

Von der zweiten indo-malayischen Art *P. testacea* Kr. durch die Färbung, matteren Körper, dichtere Punktierung u. s. w. sofort zu unterscheiden.

Mattschwarz, die 4 ersten Glieder der dunkeln Fühler und die Taster rötlichgelb, die Beine lichtgelb. Kopf, Halsschild und Flügeldecken äusserst fein und äusserst dicht chagriniert und mässig fein und mässig dicht punktiert. Die Fühler sind ziemlich kurz, gegen die Spitze verdickt, das 3. und 2. Glied fast gleichlang, das 4. stark quer, die vorletzten fast doppelt so breit als lang. Kopf mässig schmäler als der Halsschild mit grossen vorstehenden Augen. Halsschild viel schmäler als die Flügeldecken, um mehr als die Hälfte breiter als lang, oben flachgedrückt, mit 3 Längseindrücken, einem in der Mitte auf der vorderen Hälfte und zwei schief nach rückwärts convergierenden, gegen das Schildchen gerichteten, hinten miteinander verbundenen Furchen. Hinterleib gleichbreit, ziemlich fein und wenig dicht gleichmässig punktiert, glänzend.

Länge, 2 mm.

LUZON, Laguna, Los Baños.

Beim ♂ ist das 8. Tergit am gerundeten Hinterrand verdickt und besitzt zu beiden Seiten desselben je ein komma-artiges Höckerchen.

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[1] Hist. Nat. Col. Brevip. (1871), 97.

Astilbus philippinus sp. nov.

Einer grossen *Falagria* nicht unähnlich, ungefähr vom Habitus des *Astilbus heydeni* Epp.

Schwarz, glänzend, der Vorderkörper mit schwachem Erzglanz, die Fühler und Taster rostrot, die 3 ersten freiliegenden Tergite mit weissgelber Basis der aufgebogenen Seitenränder, die Beine weiss, die ganzen Vorderschenkel und die Spitzenhälfte der übrigen Schenkel schwärzlich, die Tarsen rötlichgelb. Kopf etwas breiter als der Halsschild, quer rechteckig mit abgerundeten Winkeln, glänzend glatt, unpunktiert mit ziemlich grossen Augen, die Schläfen kaum länger als deren halber Durchmesser. Fühler lang und kräftig, gegen die Spitze kaum verdickt, das 3. Glied doppelt so lang als das 2., die folgenden oblong, allmählich kürzer werdend, die vorletzten nicht quer, das letzte kürzer als die 2 vorhergehenden zusammengenommen. Halsschild hinten halb so breit als die Flügeldecken am Hinterrande, wenig breiter als lang, herzförmig, vorn am breitesten, nach rückwärts ausgeschweift verengt, in der Mitte scharf gefurcht, ziemlich gewölbt, glänzend, fein und mässig dicht punktiert. Flügeldecken zusammen stark quer, gelbbräunlich, an den Schultern breit gelb, ziemlich kräftig und dicht punktiert, glänzend. Abdomen glänzend glatt, fast unpunktiert.

Länge, 3 mm.

LUZON, Laguna, Los Baños.

Unausgefärbtes Stück mit ausgedehnter gelblichbrauner Färbung der einzelnen Körperteile.

Zyras biseriatus sp. nov.

Eine ziemlich gleichbreite Art, die durch die Dorsalreihen am Halsschild sehr ausgezeichnet ist. Rötlichgelb, stark glänzend, der Hinterleib vor der Spitze etwas dunkler.

Kopf um ein Drittel schmäler als der Halsschild, ziemlich kräftig und mässig dicht punktiert, in der Mitte geglättet, daselbst weitläufig an den Seiten im Grunde dicht chagriniert. Augen mässig gross, die Schälfen hinter denselben ungefähr so lang als der Augendurchmesser, unten gegen den Hals zu kurz gerandet. Fühler mässig kurz, seitlich stark zusammengedrückt, das 3. Glied doppelt so lang als das 2., das 4. bei breitester Ansicht schwach, die folgenden allmählich stärker quer, die vorletzten stark quer, doppelt so breit als lang, das Endglied so lang als die 2 vorhergehenden zusammen. Halsschild so breit als die Flügeldecken, um die Hälfte breiter als lang, flach gewölbt, an den Seiten gleichmässig gerundet, längs der Mittelpartie unpunktiert, zu beiden Seiten derselben mit einem leicht vertieften, vorn und rückwärts verkürzten Längseindruck, welcher ziemlich kräftig und sehr dicht punktiert ist, neben diesen Eindrücken wieder unpunktiert, an den Seiten wieder ziemlich kräftig und wenig dicht punktiert, im Grunde glänzend glatt. Flügeldecken kürzer als der Halsschild, kräftig und wenig dicht punktiert, im Grunde deutlich chagriniert. Abdomen gleichbreit, glänzend, auf den vorderen Tergiten nur mit den Querreihen borstentragender Punkte, hinten äusserst fein chagriniert und spärlich gekörnt, am 1. Tergit dichter körnig punktiert.

Länge, 5–5.5 mm.

LUZON, Laguna, Mount Maquiling.

Von *Zyras compressicornis* Fauv., der ebenfalls Dorsalreihen am Halsschild besitzt, schon durch viel kleinere Gestalt und viel feinere Punktierung des ganzen Körpers verschieden.

Zyras pulchricornis sp. nov.

♀ : In die Nähe des *Zyras fulgidus* Grav. zu stellen, fast vom gleichen Habitus, durch die Färbung und insbesondere die Bildung und Farbe der Fühler sehr ausgezeichnet.

Leuchtend gelbrot, sehr stark spiegelglänzend, die Flügeldecken mehr gelb, ihre Hinterecken schwärzlich, die Basis des 6. und die Spitze des 7. Tergites schwach quer angedunkelt, die Beine hellgelb, die Fühler tiefschwarz, die 3 ersten Glieder und das Endglied rötlichgelb. Kopf etwas schmäler als der Halsschild, quer trapezförmig, mit einzelnen mässig feinen Punkten besetzt, die Schläfen hinter den Augen fast so lang als deren Längsdurchmesser, rückwarts auf der Unterseite gerandet. Die Fühler lang und schlank, gegen die Spitze kaum verdickt, das 3. Glied ein wenig länger als das 2., die folgenden oblong, allmählich an Länge abnehmend, die vorletzten schwach quer, das Endglied schmal, langgestreckt, fast gleichbreit, an der Spitze abgerundet, fast länger als die 3 vorhergehenden zusammengenommen. Halsschild viel schmäler als die Flügeldecken, um ein Drittel breiter als lang, an den Seiten schwach gerundet, im ersten Drittel am breitesten, vor dem Schildchen mit einer tiefen scharf eingegrabenen Grube, zu beiden Seiten der unpunktierten Mittelzone mit je einer feinen Punktreihe, an den Seiten spärlich und unregelmässig punktiert. Flügeldecken wenig länger als der Halsschild, ziemlich kräftig, mässig dicht punktiert, innerhalb den Hinterecken nicht ausgerandet. Abdomen spiegelblank, fast unpunktiert.

Länge, 4 mm.

LUZON, Laguna, Mount Maquiling (1 Exemplar).

Hoplandria minima sp. nov.

Noch kleiner als die zweite von den Philippinen bekannte Art *H. philippina* Brh., von derselben ausserdem in nachfolgenden Punkten verschieden.

Kopf und Halsschild sind fast ganz unpunktiert, spiegelblank, letzterer kürzer, namentlich aber im Verhältnis zu den Flügeldecken schmäler, diese sind viel stärker und wohl viermals weitläufiger punktiert als bei *H. philippina.* Auch der Hinterleib ist ausser den Querreihen von Borstenpunkten auf den einzelnen Tergiten unpunktiert, spiegelglänzend. Der Halsschild ist deutlich schmäler als die Flügeldecken und viel gewölbter als bei *H. philippina.*

Länge, 1⅔ mm.

LUZON, Laguna, Los Baños.

Ich stelle diese Art mit Bedenken zu *Hoplandria,* kann meine Zweifel jedoch vorläufig nicht lösen, weil ich das einzige mir gehörige Exemplar nicht opfern kann.

Genus **GASTROPAGA** novum

Die neue Gattung gehört in die Tribus *Myrmedoniini* und hat hier eigentlich keine nähere Verwandtschaft.

Ungefähr vom Habitus und der Behaarung einer *Brachida,* jedoch mit gleich breitem Hinterleib, zeigt die neue Gattung verschiedene Merkmale, insbesondere die Zungenbildung und die Bildung der inneren Maxillarlade, die ihr in der Tribus eine isolierte Stellung geben. Gleichbreit, stark gewölbt, ziemlich dicht grau behaart, die Seiten des Hinterleibes sehr dicht mit schwärzlichen langen Haaren gleich einem Barte besetzt.

Der Kopf viel schmäler als der Halsschild, nicht eingeschnürt, mit ziemlich grossen Augen und scharf und vollständig gerandeten Schläfen. Die Fühler mässig kurz, gegen die Spitze verdickt, ihr 3. Glied wenig kürzer als das 2., das 4. ziemlich stark quer, die folgenden allmählich breiter werdend, die vorletzten doppelt so breit als lang, das Endglied konisch verengt, länger als die 2 vorhergehenden zusammen genommen. Die Oberlippe stark quer, vorn abgestutzt mit breit abgerundeten Vorderecken. Die Mandibeln kurz, die eine mit einem scharfen Zähnchen knapp vor der Mitte, am Innenrande mit einem ziemlich dicht bewimperten Hautsaume, an der Basis mit je 2 dicht neben einander stehenden Querreihen dichter kurzer Zähnchen. Die Maxillarladen ziemlich gestreckt, die Innenlade gegen die Spitze hornig, diese selbst hakig gekrümmt, hinter derselben mit einer Anzahl kurzer, starrer, ziemlich weitläufig stehender Zähne und hinter denselhen mit einer Anzahl langer, gekrümmter, ziemlich dicht stehender Stacheln bewehrt, daselbst auch lang behaart, die basale Hälfte des Innenrandes ist häutig. Die Aussenlade mässig schmal, hornig, an der häutigen Spitze dicht mit langen fiederförmigen Haaren und innen an der Spitze noch mit Haarborsten besetzt. Die Kiefertaster viergliedrig, schlank, das 3. Glied mässig angeschwollen, das Endglied pfriemenförmig, weniger als halb so lang als das 2. Das Kinn quer trapezförmig, an der Spitze gerade abgestutzt. Die Zunge sehr schmal und langgestreckt, bis über die Spitze des 2. Lippentastergliedes nach vorn reichend, an der Spitze schmal und tief gespalten, der Zunge der Gattung *Bolitochara* recht ähnlich. Die Lippentaster ziemlich kräftig, das 1. Glied sehr dick, kaum so lang als an der Basis breit, das 2. kaum kürzer, aber doppelt schmäler als das 1., das Endglied viel schmäler und kürzer als das 2. Glied.

Der Halsschild ist sehr kurz und breit, mehr als doppelt so breit als lang. Die Flügeldecken sind am Hinterrande vor den Hinterecken scharf ausgerandet. Der Hinterleib an der Basis der 3 ersten freiliegenden Tergite quer eingedrückt.

Fortsatz der Mittelbrust zugespitzt, fast bis zum Hinterrande der Mittelhüften reichend, diese ziemlich breit getrennt. An den viergliedrigen Vordertarsen die 3 ersten Glieder ziemlich gleichgebildet, das letzte fast so lang als die übrigen zusammen, an den fünfgliedrigen Mitteltarsen die 4 ersten Glieder fast gleich, das Endglied etwas kürzer als die 3 vorhergehenden zusammen. Die fünfgliedrigen Hintertarsen gestreckt, das 1. Glied viel länger als das 2., das Endglied etwas länger als 3 und 4 zusammen.

Die neue Gattung ist bisher nur durch die folgende philippinische Art vertreten.

Gastropaga bakeri sp. nov.

Pechbraun bis schwärzlich, ziemlich glänzend, die Seiten des Halsschildes heller durchscheinend, die Wurzel und das Endglied der Fühler, die Taster und Beine rötlichgelb. Kopf weitläufig und sehr undeutlich punktiert, glänzend. Halsschild fast so breit als die Flügeldecken, an den Seiten gerundet, nach vorn stärker verengt als nach rückwärts, kurz vor den abgerundeten Hinterecken am breitesten, gleichmässig gewölbt, ohne Eindrükke, etwas deutlicher und weniger weitläufig punktiert als der Kopf. Flügeldecken deutlich länger als der Halsschild, ziemlich kräftig deutlich rauh und mässig dicht, der Hinterleib mässig fein und ziemlich gleichmässig wenig dicht punktiert.

Länge, 2–2.5 mm.

LUZON, Laguna, Los Baños.

Aleochara flavipennis sp. nov.

Ganz vom Habitus der *Aleochara curtula* Goeze und derselben äusserst nahe verwandt, von ihr jedoch ausser der markanten Färbung noch durch viel gröbere und dabei weitläufigere Punktierung des Kopfes und Halsschildes, sowie durch weitläufigere Punktierung der Flügeldecken sofort zu trennen.

Die Farbe ist schwarz, die Flügeldecken und die Spitze des Hinterleibes vom Hinterrand des 7. Tergites angefangen hellgelb, die Seiten des Halsschildes namentlich vorn mehr oder minder rötlich durchscheinend.

Länge, 4⅓–5.5 mm.

LUZON, Laguna, Mount Maquiling.

DRYOPIDÆ ET HETEROCERIDÆ DES PHILIPPINES

Par A. GROUVELLE
(*Paris, France*)

Sostea atramentaria sp. nov.

Suboblonga, apice elytrorum acuminata, convexa, nitidula, atra, antennis pedibusque plus minusve fusco-piceis vel rufopiceis. Caput fronte subdepressum, haud dense profundeque punctatum, pilis flavo-cinereis, minimis, tenuibus et stratis dense vestitum, aliquibus pilis fuscis, erectis, elongatis intermixtis. Prothorax antice angustatus; lateribus antice modice arcuatis, postice subrectis, antrorsum convergentibus; pronoto in longitudinem regulariter convexo, subparce et haud valde punctato; punctis in angulos posticos sparsioribus; pubescentia illi capitis simili sed pilis erectis longioribus et densioribus. Elytra humeris rotundata, quam prothorax vix altiora, lateribus subparallela, ad apicem attenuata et conjunctim acuminata, 2.5 longiora quam simul latiora, pilis minimis cinereis plus minus erectis et pilis fuscis, elongatis, erectis, ornata, punctato-striata; punctis et striis ad latera paulatim majoribus; stria suturali lapicem versus manifesta, in disco nulla; striarum intervallis ad apicem vix elevatis, marginem apicalem attingentibus; disco in longitudinem quam prothorax valdus convexo.

Long., 3.7 mm.

LUZON, Laguna, Los Baños (1 Exemplaire, *coll. A. Grouvelle; C. F. Baker*).

Suboblong, environ trois fois plus long que large, très convexe, assez brillant, noir; antennes et pattes roux de noix plus ou moins foncé. Tête subdéprimée sur le front, éparsément et peu profondément ponctuée, couverte d'une pubescence formée de poils flaves-cendrés, assez fins, serrés, masquant presque le tégument, entremêlés de poils sombres, dressés et allongés; pubescence de l'épistome plus serrée, plus claire, en partie plus allongée et plus redressée; yeux séparés par un intervalle un peu plus grand que deux fois et demie leur diamètre transversal. Prothorax retréci en avant, faiblement arqué sur les côtés, un peu plus de deux fois plus large à la base que long, largement et peu profondément échancré au bord antérieur; angles antérieurs aigus, un peu saillants en avant, côtés rebordés par un bourrelet un peu accentué; angles postérieurs aigus, faiblement saillants en arrière; base trisinuée comme chez tous les *Sostea.* Disque longitudinalement et régulièrement convexe; présentant, vers le deuxième tiers de la longueur à partir de la base, un pli transversal, faiblement marqué; convexité du disque déterminant des marges latérales concaves, à peine marquées sur la région des angles postérieurs, s'élargissant vers la base et se dilatant sur la région des angles postérieurs. Ponctuation plus ou moins espécée, fine sur le disque, beaucoup plus grosse sur la région des angles et surtout sur celle des angles antérieurs. Pubescence semblable à celle de la tête, rare sur le disque, assez dense sur les angles postérieurs, entremêlée de longs poils sombres, dressés. Ecusson faiblement transversal, subtriangulaire. Elytres arrondis aux épaules, à peine plus larges que le prothorax à la base, à peine élargis, presque subparallèles, atténués arqués vers le sommet à partir du dernier tiers de la longueur, acuminés ensemble à l'extrémité, environ deux fois et demie plus longs que larges ensemble, longitudinalement et régulièrement convexes, présentant vers le premier tiers de la longueur le point le plus élevé de leur convexité, assez brusquement infléchis à leur extrémité. Ponctuation formant des lignes ponctuées fines sur le disque, puis des lignes ponctuées-striées devenant progressivement plus fortes vers les bords latéraux; lignes suturales et premières dorsales plus fortes, striées vers l'extrémité; toute les autres striées-ponctuées, brièvement plus accentuées à la base, atténuées vers le sommet; strie suturale et 1re, 2^{e}, 3^{e} et 4^{e} stries discoidales de chaque élytre atteignant le bourrelet apical; 5^{e} et 6^{e} stries écourtées à l'extrémité; calus huméraux marqués; stries suturales terminées par un gros point enfoncé. Bords latérals vus de face assez brièvement sinués contre l'extrémité de l'élytre. Pubescence formée de poils sombres, dressés et de petits poils cendrés, rares, plus abondants sur les côtés et vers le sommet. Pubescence du dessous du corps dense, cendrée, un peu flave.

Voisin de *S. sodalis* Pasc.; distinct par sa pubescence cendrée, plus abondante et par l'absence de stries sur le disque des élytres.

Sostea ebenina sp. nov.

Sublonga, apice elytrorum acuminata, convexa, nitidula, atra, antennis pedibusque fusca, tarsis rufa. Caput fronte convexiusculum, pilis floro-cinereis, elongatis, stratis, dense vestitum, occipite subdense valdeque punctatum; punctis apicem versus minoribus et paulo sparsioribus. Prothorax antice angustatus; lateribus antice arcuatis, postice subrectis et subparallelis; pronoto ultra apicem transversim convexo-elevato, subparce profundeque punctato, punctis in disco minoribus et sparsioribus; pubescentia illi capitis simili, sed pilis fuscis, elongatis, erectis, intermixta. Elytra humeris rotundata, tunc quam prothorax latiora, lateribus subsinuata et subparallela, dein apicem versus attenuata et conjunctim subspinoso-acuminata, 3.5 longiora quam simul latiora, punctato-striata; striis et punctis ad latera paulatim majoribus; stria suturali praecipue in medio laevi; disco in longitudinem quam pronoto validius convexo. Elytra pilis fuscis, elongatis, erectis et praecipue apicem versus pilis cinereis plus minusve stratis ornata.

Long. 3–3.7 mm.

NEGROS (plusieurs exemplaires, *coll. A. Grouvelle*).

Oblong, environ trois fois plus long que large, très convexe, assez brillant, noir; antennes et pattes plus ou moins enfumées, tarses rougeâtres. Tête convexe, fortement et assez densément ponctuée sur l'occiput, plus éparsément et moins fortement ponctuée vers la partie antérieure, couverte d'une pubescence formée de poils couchés, longs, assez serrés, jaunes cendrés, plus fins sur le front, plus épais et presque très serrés sur le devant de la tête et sur l'épistome; entremêlés de quelques points médiocrement longs; yeux séparés par un intervalle subégal à deux fois et demie leur diamètre transversal. Prothorax rétréci en avant, arqué sur les côtés, principalement en avant, subparallèle contre la base, un peu plus de deux fois plus large à la base que long, subtronqué au milieu du bord antérieur et fortement sinué de chaque côté devant les yeux; angles antérieurs obtus; côtés rebordés en bourrelet; angles postérieurs aigus, un peu saillants en arrière; base trisinuée comme chez tous les *Sostea.* Disque longitudinalement convexe surtout en avant, présentant vers le deuxième tiers de la longueur un pli transversal, infléchi en avant; convexité du disque déterminant des marges latérales concaves, très abaissées en avant, un peu étroites devant le pli transversal, à peine élargies en avant, devenant progressivement très larges, sur les angles postérieurs. Ponctuation profonde, un peu écartée sur le disque, plus forte et plus serrée sur le reste de la surface. Pubescence semblable à celle de la tête, plus rare sur le disque, entremêlée de longs poils sombres dressés. Ecusson faiblement transversal, émoussé au sommet faiblement pubescent. Elytres arrondis aux épaules, alors un peu plus larges que le prothorax à la base, subparallèles sur les côtés et subsinués vers le premier tiers de la longueur, atténués arrondis vers le sommet à partir du dernier tiers de la longueur, terminés ensemble en pointe aigüe, environ deux fois et demie plus longs que larges ensemble, longitudinalement convexes, présentant vers le premier tiers de la longueur le point le plus élevé de leur convexité. Ponctuation disposée en lignes striées, ponctuées, peu marquées pour les deux premières près de la suture, devenant ensuite progressivement plus fortes vers les bords latéraux; sur chaque élytre 1^er^ et 2^e^ intervalle à partir de la strie suturale brièvement et faiblement relevés à la base; strie suturale fortement enfoncée dans la partie apicale, 1^re^ strie discoïdale et suivante atténuées vers le sommet; 4^e^, 5^e^, 6^e^ et 7^e^ intervalle soudés près de la bordure latérale; celle-ci étroite sur les côtés à la base, un peu élargie au sommet; calus huméraux marqués. Pubescence comprenant des longs poils sombres dressés, peu serrés, des poils cendrés beaucoup plus courts, rares, localisés sur la partie apicale des élytres et des poils semblables à ceux de la tête bordant très étroitement les bords latéraux. Dessous du corps noir, étroitement bordé de rougeâtre sur les marges latérales des sternites.

Voisin de *S. sodalis* Pasc.; mais pubescence plus abondante, forme plus étroite, intervalles des stries plus étroits, marge lisse de la base des élytres plus étroite. Plus voisin de *S. atramentaria* Grouv. mais moins densément pubescent et plus fortement strié sur les élytres. Peut-être une race locale de cette espèce.

Heterocerus latus sp. nov.

Oblongus, paulo magis 2.5 longior quam latior, convexus, nitidulus, crebre punctulatus, nigro-brunneus; prothoracis elytrorumque marginibus lateralibus et in elytris aliquibus maculis linearibus fulvo-rufis; antennarum basi testacea. Caput transversissimun, fronte convexiusculum, antice truncatum pube fusco et fusco-cinerea, brevissima demissime vestitum; margine antico tenuiter cinereo-ciliato; labro modice transverso, antice rotundato. Prothorax transversissimus, antice valde angustatus, postice subparallelus, crebre punctulatus, dense tenuiterque fusco-pubescens, pilis longioribus, erectis, praecipue in marginibus anticis lateralibusque intermixtis; margine antico subtruncato, breve cinereo-ciliato; angulis anticis obtusis, lateribus arcuatis; angulis posticis sat late obtusis; basi tenuiter marginata. Elytra humeris rotundata, apice conjunctim breviter rotundata, circiter 1.5 longiora quam simul latiora, crebre punctulata, fusco-cinereo pruinosa; maculis fulvo-rufis linearibus, in longitudinem ordinatis, parum manifestis, in partem apicalem elytrorum dispositis. Corpus subtus in maxima parte infuscatum; pedibus sordido-testaceis.

Long., 3 mm.

LUZON, Laguna, Los Baños (2 exemplaires, *coll A. Grouvelle; C. F. Baker*).

Oblong, plus de deux fois plus long que large, convexe, un peu brillant, très densément pointillé, varié de roux sur les marges latérales du prothorax et des élytres et sur la moitié apicale de ces derniers. Antennes de 10 articles. Tête moins de deux fois plus large avec les yeux que longue avec les mandibules, modérément convexe sur le front, couverte d'une pubescence sombre en partie légèrement cendrée, presque feutrée; bord antérieur tronqué, cilié de petits poils cendrés; côtés modérément sinués en avant des yeux, ceux-ci peu saillants, à très petites facettes; labre plus de deux fois plus large à la base que long, atténué vers l'avant, arrondi au bord antérieur. Prothorax fortement rétréci en avant, subparallèle à la base, environ deux fois et demie plus large à la base que long, couvert d'une pubescence sombre, fine et serrée, entremêlée surtout au bord antérieur de poils plus longs dressés; bord antérieur légèrement arrondi en avant dans le milieu, largement subtronqué vers les extrémités, ciliés de courtes soies cendrées, brièvement rebordé en bourrelet aux extrémités; angles antérieurs obtus, un peu moins obtus lorsqu'ils sont vus de face; bords latéraux arqués, bordés par une marge d'un roux un peu sombre, dilatée sur la région des angles antérieurs; angles postérieurs obtus; base arquée, finement rebordée sur toute la longueur; troncature des angles postérieurs de la couleur de la marge latérale, bordée en dessus par la strie marginale de la base. Ecusson oblong, noirâtre. Elytres arrondis aux épaules, subparallèles brièvement arrondis au sommet, environ une fois et demie plus longs que larges ensemble, couverts d'une pruinosité brun cendré; base légèrement sinuée, rebordée de chaque côté de l'écusson par une très étroite marge roux un peu sombre, n'atteignant pas le calus huméral; bords latéraux étroitement rebordés, présentant une marge d'un roux sombre, brièvement élargie vers le premier tiers de la longueur, s'atténuant et s'effaçant vers le sommet; sur la moitié apicale du disque, quelques vestiges de taches longitudinales linéaires, toujours d'un roux sombre, semblant distribuées sur deux bandes formant chacune un angle très obtus, orienté vers le sommet de l'élytre; calus huméraux assez longuement marqués: ponctuation plus forte que celle du prothorax présentant, lorsque l'insecte est vu de côté, des vestiges de sillons longitudinaux. Dessous du corps noirâtre, marges latérales du prosternum et des segments abdominaux, extrémités de l'abdomen, milieu du prosternum et pattes roux un peu enfumé. Stries marginales des hanches intermédiaires très fortement arquées. Partie externe de la bordure des plaques fémorales des hanches postérieures large, peu saillante, longuement striolée sur la partie basilaire.

NOTICES OF CERTAIN PHILIPPINE FULGOROIDEA, ONE BEING OF ECONOMIC IMPORTANCE

By C. F. BAKER

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TWO PLATES AND 1 TEXT FIGURE

Melichar[1] describes a new fulgorid genus, *Egropa*, with one species, *inusta*, which he refers to the Tettigometridæ ("Tettigometrini"). His figures give the body outlines and a front and lateral view of the face. His species, from the description, must have been a very beautiful object, but unfortunately he possessed only a single specimen. Distant[2] inserts *Egropa* as an unplaced genus following the Issidæ. He quotes Melichar's descriptions and copies his figures, remarking that he had never seen the species. Considering the vast extent of the oriental material studied by Distant, one might infer that this species is a great rarity. However, it will doubtless be secured in great numbers when its food-plant is discovered. In 1907 Bierman[3] described a second species of this interesting genus, as living on *Cassia fistula* in Java. In the same year he figured both nymphs and imagoes of this species with the name of *Egropa jacobsoni.*[4]

It may be commonly noticed in these Islands that many of the large and much-prized fruits of the guanabana (*Anona muricata*) are deformed, are not plump and full all around, but bent and depressed on one side and commonly stunted in growth. Nymphs and imagoes of a species of *Gargara* (Membracidæ) were to be found occasionally on this tree, and the *Gargara* was suspected of being the cause of this common damage. Only now, after being here three years, do I discover it to be due to a beautiful species of *Hilda* (=*Egropa*), which evanescently breeds in great numbers on the surface of the very young fruits. It lays very numerous eggs in patches on the surface of the fruit and on surrounding leaves. This year it happens that large numbers of these eggs are parasitized by a minute chalcid,[5] so that it is possible that the coming year will see less injury from this cause in this locality. I have also taken a single specimen on *Anona reticulata*. All of the cultivated anonaceous fruits in the Philippine Islands were imported from America; therefore it is probable that this insect finds its natural food among native anonaceous fruits of the Philippine forests.[6]

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[1] Homopteren Fauna von Ceylon (1903), 82, Taf. III, fig. 13, a.

[2] Fauna Brit. Ind. Rhynch. (1906), 3, 268.

[3] *Ent. Bericht.* (1907), 2, 162.

[4] *Notes Leyden Mus.* (1907), 29, 158, Taf. III, fig. 6.

[5] Being described under the name *Pseudobrachysticha semiaurea* Girault gen. et. spec. nov.

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[6] After this paper, describing an apparently new species of *Egropa*, had gone to the printer, I made what is, to me, an exceedingly important and interesting discovery: that Distant, although he did not recognize the identity of Melichar's *Egropa* [Fauna Brit. India—Rhynch. (1906), 3, 368], has since described entirely congeneric species in the genus *Hilda* (= *Isthmia* Stål, præocc.). Kirkaldy and Distant had considered this one of the Issidæ, though Stål had associated it with *Tettigometra*. Melichar properly placed it—as *Egropa*—in the Tettigometridæ. Thus set on the right track, I soon discovered that my supposedly new species of *Egropa* was identical with *Isthmia breviceps* Stål, a species apparently not recognized since its description in 1870. I have a second Philippine species from Palawan, as yet unstudied. The generic synonymy and bibliography of this economically important group is as follows:

Genus **Hilda** Kirkaldy

Isthmia Walker—nom. præocc.—List Hom. (1851), **3**, 732; STÅL, Hem. Afr. (1866), **4**, 218.
Hilda Kirkaldy, Entomologist (1900), 243.
Egropa Melichar, Hom. Ceylon (1903), 82; DISTANT, Fauna Brit. Ind.—Rhynch. (1906), **3**, 368.

Hilda undata Walker.
Isthmia WALKER, List. Hom. (1851), **3**, 732. Sierra Leone.

Hilda funesta Stål.
Tettigometra Stål, Of. Vet. Ak. Forh. (1854), 249; WALKER, List Hom. Suppl. (1858), 336; STÅL, Of. Vet. Ak. Forh. (1862), 494.
Isthmia Stål, Hem. Afr. (1866), **4**, 219. Sierra Leone.

Hilda patruelis Stål.
Tettigometra STÅL, Of. Vet. Ak. Forh. (1855), 100.
Isthmia STÅL, Hem. Afr. (1866), **4**, 219. Caffraria.

Hilda breviceps Stål.
Isthmia STÅL, Of. Vet. Ak. Forh. (1870), 761. Philippines (Luzon).

Hilda inusta Mel.
Egropa MELICHAR, Hom. Ceylon (1903), 82. Ceylon.

Hilda jacobsoni Bierm.
Egropa BIERMAN, Ent. Ber. (1907), **2**, No. 34, 162, Java; BIERMAN, Notes Leyden Mus. (1907), **29**, 158.

Hilda malayensis Dist.
DISTANT, Rec. Ind. Mus. (1908), **2**, 129. Siam, Malay States, Bukit Besar.

Hilda bengalensis Dist.
DISTANT, Ann. Mag. Nat. Hist. (1909), **3**, 41. Bengal.

Hilda breviceps Stål.

Color.—Upper part of face and narrow margin of vertex black; remainder of head stramineous; below stramineous; femora apically, tibiæ and tarsi, darker; sides of venter pale green. Pronotum green, becoming brownish posteriorly, the submargin narrowly black, the margin white, and the anterior margin may also be more or less narrowly whitish. Scutellum green, narrowly black-margined posteriorly. Tegmina clear brown, with 4 paler areas, the darker areas blackish edged near costa, the blackish edges in every case flanked by small, elongate, shining white calloused stripes; a white calloused stripe in the clavus, another between this and the base of the tegmina on claval suture, and a third along the anal margin. Distad of the white stripe on disk of clavus is a commissural green spot; a minute white dash occurs on the inner apical margin (Plate I, fig. 1). In the male all of the greens and browns are darkened, becoming almost black, bringing the white markings out in strong relief. All below, and sometimes portions above, more or less covered with a pulverulent white wax.

General proportions of body as in *Hilda inusta* Mel. Width of the vertex (Plate I, fig. 2) somewhat more than twice the length, the fore margin broadly and evenly rounded, and the surface minutely rugulose. Width of pronotum slightly more than three and one half times the length, the hind margin nearly straight, the surface, as also that of scutellum, with sparse and very minute setigerous punctures. Scutellum one half longer than vertex and pronotum together. Upper margin of head, as seen from side (Plate I, fig. 3), irregularly curved. Face deeply concave above the central umbo. Ocellus touching eye. Last antennal joint of great size, the length two and one half times the width, tapering to the tip, which reaches the upper margin of the eyes. Form of face shown in Plate I, fig. 4; female genitalia in Plate I, fig. 6; male genitalia in Plate I, fig. 5. Wing venation as in text fig. 1. Tegmina very brittle coriaceous, venation indistinct, the general surface convex, but sharply and deeply grooved along the claval suture. Length of female, 5 millimeters, of male, 4.25.

Egg.—The egg (Plate I, fig. 10) is deposited in masses of from 10 to 100 or more, neatly arranged side by side in adjoining rows on the surface of a fruit or leaf. They measure 0.3 by 0.65 millimeter, and are pale yellow, the surface covered with sharply raised reticulations. The micropylar end is provided with a short stalk, capped by a pure white knob.

Nymph.—The nearly full-grown nymph is a most extraordinary object, reminding one strongly of certain membracid nymphs. The pronotum possesses 3 fingerlike projections, the middle one of which is much the largest. The mesonotum possesses one similar median projection. The abdominal segments at sides are extended into huge acute projections as shown in Plate I, fig. 7. The face of the nymph (Plate I, fig. 8) should be compared with that of the adult. The antennæ and vertex, especially, differ very strikingly from those of the adult. Plate I, fig. 9, is a view of the head and thorax of the nymph from in front, looking in the direction of the longitudinal axis of the body.

LUZON, Laguna, Mount Maquiling (*coll. Baker*).

Living in extensive colonies on the young fruits of the guanabana (*Anona muricata*).

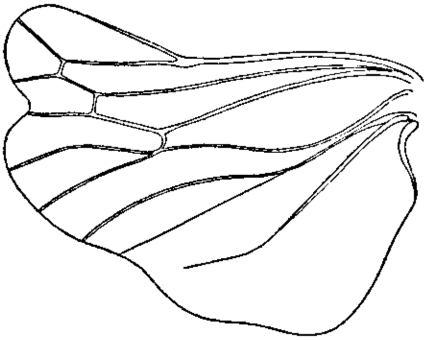

FIG. 1. Wing of *Hilda breviceps* Stål.

This species is very close to *Hilda jacobsoni* Bierman, but is distinct in form of frontal umbo and other structural details, as well as in outlines of nearly all parts of the color pattern of tegmina.

In 1870 Stål[7] described the new genus and species *Augila sulciceps*, remarking, "Genus singulare, maxime insigne, optime, ut puto, prope Calliscelem locandum." This remained a monotypic genus until 1906, when Distant[8] added a second species, *A. binghami*. In his monograph of the Issidæ, Melichar placed this genus in the Caliscelinæ ("Caliscelidæ"), and it is the first species to be treated in the monograph. The chief reason for so placing it must have been Stål's suggestion, for, by Melichar's definition, *Augila* could not possibly be placed in that subfamily. Melichar introduces a difficulty into the study of the genus, in that his figure of the species, supposedly made from the type (since he quotes "Stalsche Type im Museum in Stockholm" after the description), differs widely from Stål's original figure,[9] leaving one to wonder which figure is correct. In Stål's figure the width of pronotum is about four times the length, while in Melichar's it is about two and three fourths times. The proportions of scutellum are likewise entirely different in the two figures, and the venation of tegmina beyond the nodal vein is even specifically different. I have encountered 3 distinct species of this remarkable genus in the Philippines, none of which even nearly corresponds to the descriptions and figures of *A. sulciceps,* as given by either Stål or Melichar. Evidently the type of *A. sulciceps* needs to be restudied and refigured. If Distant's figure is correct (he gives almost no structural characters in the specific description), then his species is very distinct from anything yet found in the Philippines.

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[7] Hemp. Ins. Philipp. (1870), 754.

[8] Fauna Brit. Ind.—Rhynch. (1906), 3, 335.

[9] Op. cit., Pl. IX.

In Luzon I have also discovered a fulgorid with the general habitus and some of the essential characters of *Augila,* and evidently closely related to it, though differing widely in a number of respects. Melichar has made this the type of a new genus, *Augilina,* naming its sole representative *A. longipes.*[10] This genus is still more widely removed from any other genus in the Caliscelinæ than is *Augila.* In my opinion these two genera should constitute a new subfamily, to come before the Caliscelinæ.

Sufamily **AUGILINÆ** novum

A subfamily of the Issidæ, coördinate with Caliscelinæ, Hemisphaerinæ, and Issinæ. Distinguished by the long and slender body, very slender abdomen, and the very long and parallel-sided membranaceous tegmina, which surpass the abdomen, and which have a strong transverse nodal vein, passing across from apex of clavus to costa, proximad of which occur very few cells. Vertex narrower than eye width and acutely produced far in front of eyes. All legs very long, the forelegs more than three times the length of head and pronotum together.

Genera of the subfamily Augilinæ.

a^1. Vertex declivous; apical area of tegmina with numerous supernumerary veinlets and cells; anterior femora and tibiæ laminately inflated.
Augila Stål.

a^2. Vertex distinctly upturned; apical area of tegmina without supernumerary veinlets, anterior femora and tibiæ not laminately inflated.
Augilina Melichar.

Synopsis of the species of Augila.

a^1. Tegmina apically evenly rounded, with at least 1 large cell before the nodal vein; length of vertex less than five times the width between eyes.
  b^1. Face shorter than vertex (as figured by Melichar), and its margin straight in side view; apical area of tegmina only brown on inner portion .... **A. sulciceps Stål.**

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[10] *This Journal, Sec. D* (1914), 9, 276, Pl. I, fig. 8.

b^2. Face always longer than vertex, and its margin deeply sinuate in side view; apical area of tegmina all brown, or both sides decolored.
  c^1. Tegmina with 3 large anteapical cells, one of these being in the middle area, the supernumerary cells of apical area comparatively few and all long and narrow (as figured by Distant). **A. binghami** Dist.
  c^2. Tegmina with only 2 large anteapical cells, without one in middle area; supernumerary cells very numerous, many short and broad.
    d^1. Lateral carinæ of vertex evenly curved; the genæ very short as seen in vertex view.. **A. valdesii** sp. nov.
    d^2. Lateral carinæ of vertex distinctly bisinuate on anteocular portion; the genæ long as seen in vertex view. **A. negrosensis** sp. nov.
a^2. Tegmina strongly angulated at outer tip, with only 1 large anteapical cell; length of vertex more than six times width between eyes. **A. angulata** sp. nov.

Augila valdesii sp. nov.

Color entirely sordid stramineous, except the legs. Forelegs darker, with 2 rather indistinct still darker bands across the fore tibiæ. Middle and hind legs white, with hind coxæ and extreme tips and bases of hind femora somewhat darkened. Tegmina hyaline, the main veins brown, the supernumerary veins red.

Length of vertex (Plate II, fig. 14) about four and one half times the width between the eyes, the lateral carinæ evenly curved, the median sulcus somewhat cross striate posteriorly, smooth anteriorly. Width of pronotum about four times the length, with 2 strong longitudinal furrows, one on each side of median line, the surface smooth. The scutellum smooth, with lateral carinæ nearer to median line than in *A. negrosensis,* and the entire area between the carinæ strongly depressed. Upper margin of head as seen from side (Plate II, fig. 17) broadly and shallowly emarginate, the margin somewhat elevated beyond the concavity. Face emarginated distinctly below the middle. Ocellus distinctly farther from the eye than its own width. Antennæ with somewhat swollen tips. Venation of apical area of tegmina as shown in Plate II, fig. 15. The male genitalia cannot be studied without dissection, which will require more material than is available; however, a partial side view, simply showing the sutures as they appear, is given in Plate II, fig. 16.

Male, length to tip of tegmina, 8.5 millimeters.

LUZON, Laguna, Mount Maquiling (*coll. Baker*).

This very distinct species is named for Julian Valdez, an orphaned Cuban, whom I took under my protection eleven years ago, and have since trained to be one of the most efficient field collectors known to me.

Augila negrosensis sp. nov.

Color piceous to black with the following parts sordid stramineous: Head above and around eyes, tip of scutellum, mesonotum, metanotum, base of abdomen above, 2 spots on inner lamina of forė tibiæ, bases of middle femora, middle tibiæ, and hind tibia toward tips. Tarsi all whitish, with the last joint black-tipped above. Tegmina hyaline, the main veins black, the apical area dark brown, the veins of apical area reddish.

Width of vertex between eyes (Plate II, fig. 20) about one fifth the length, the lateral carinæ strongly bisinuate on anteocular area, the intercarinal area at this point more deeply sulcate and with inner surface smooth and shining. Width of pronotum somewhat more than three times the length, with a strong complete median groove, the surface sparsely punctate. Scutellum minutely transversely wrinkled and with complete longitudinal carinæ on the midlateral lines. Upper margin of head, as seen from side (Plate II, fig. 21), broadly bisinuately emarginate. Margin of face in side view strongly incurved at about the middle. Ocellus distant about its own width from the eye. Antennæ nearly cylindrical. Venation of apical area of tegmina as shown in Plate II, fig. 19; wing venation as shown in Plate II, fig. 18.

Male, length to tips of tegmina, 9.5 millimeters.

NEGROS, Occidental Negros, Cuernos Mountains (*coll. Baker*).

In coloration this species strongly resembles *A. sulciceps* and *A. binghami*, but is very distinct from these in structural characters, at least as these are described and figured by Stål, Melichar, and Distant.

Augila angulata sp. nov.

Color entirely pale stramineous, the fore legs sparsely speckled with brown dots and with a single brown band across the fore tibiæ; the venter blackish; middle and hind legs white, with bases of hind femora darkened; pronotum and scutellum with a median red line. Tegmina hyaline, the veins all very pale except near inner tip, where they are reddish; the apical area brownish except along inner and outer margins.

Width of vertex (Plate II, fig. 12) between eyes about one sixth the length, the lateral carinæ very gradually curved, a large part of the median sulcus cross striate, though smooth anteriorly. Width of pronotum about three times the length, with a carina on either side of median line and a broad median sulcus between these carinæ. Scutellum smooth, with longitudinal carinæ on the midlateral areas. Upper margin of head as seen from side

(Plate II, fig. 11) not emarginate, the line slightly raised before the apex. Face emarginated just below middle. Ocellus its own width from the eye. Antennæ very short, the last joint globular. Tegmina strongly angulated at outer tips, the venation of apical area as shown in Plate II, fig. 13.

Female, length to tips of tegmina, 9.5 millimeters.

LUZON, Laguna, Mount Maquiling (*coll. Baker*).

This species differs widely from all others of the genus by the form of tegmina.

ILLUSTRATIONS

[Drawings by Baker. All, except that of the egg, are made to the same scale.]

PLATE I

FIGS. 1 to 10. *Hilda breviceps* Stål.

1, tegmina; *2*, vertex, pronotum, and scutellum; *3*, side view of head and pronotum; *4*, face in view at right angle to plane of surface between umbo and clypeus; *5*, male genitalia; *6*, female genitalia; 7, nymph; *8*, face of nymph; *9*, front view of head and pronotum of nymph in line of long axis of body; *10*, egg.

PLATE II

FIGS. 11 to 13. *Augila angulata* sp. nov.

11, side view of head; *12*, vertex; *13*, apical area of tegmina.

14 to 17. *Augila valdesii* sp. nov.

14, vertex; *15*, apical area of tegmina; *16*, side view of male genitalia; *17*, side view of head.

18 to 21. *Augila negrosensis* sp. nov.

18, apical portion of wing; *19*, apical area of tegmina; *20*, vertex; *21*, side view of head and pronotum.

TEXT FIGURE

FIG. 1. Wing of *Hilda breviceps* Stål.

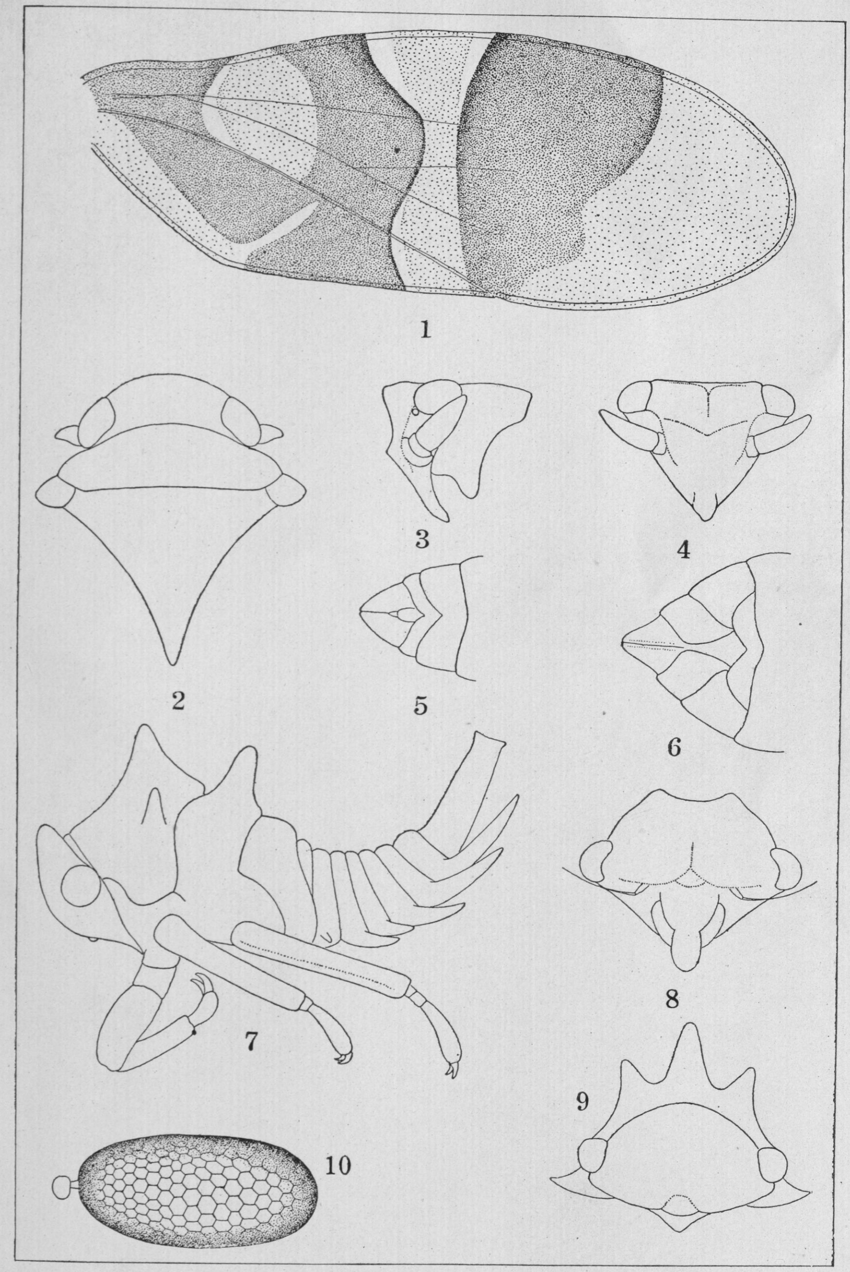

PLATE I.

Hilda breviceps Stål. 1, tegmina; 2, vertex, pronotum, and scutellum; 3, side view of head and pronotum; 4, face in view at right angle to plane of surface between umbo and clypeus; 5, male genitalia; 6, female genitalia; 7, nymph; 8, face of nymph; 9, front view of head and pronotum in line of long axis of body; 10, egg.

ARE ATYA SPINIPES NEWPORT AND ATYA ARMATA MILNE EDWARDS SYNONYMS FOR ATYA MOLLUCCENSIS DE HAAN?

By R. P. COWLES

(From the Department of Zoölogy, College of Liberal Arts,
University of the Philippines)

ONE TEXT FIGURE

In 1868 Eduard von Martens[1] stated that he had received several specimens of the genus *Atya* from the Philippine Islands. The specimens differed from one another in the size and armature of the third legs and in the body length, but they were otherwise similar, and von Martens reached the conclusion that they were all of the same species. The largest specimen agreed with *Atya armata* Milne Edwards,[2] collected in the Philippines, and described as having a long heavy spine on the lower border of the merus of the third leg. However, von Martens's smaller specimens agreed with the description of species of *Atyoida* in which the third legs are but slightly larger than the fourth and fifth and in which there is only a weak, slender, and inconspicuous spine on the merus. Specimens intermediate in size showed gradations from the large third legs with the heavy spine to the small third legs with the weak inconspicuous spines. As a result of his observations von Martens rightly discarded the genus *Atyoida,* considering the specimens upon which it was based as the young of some species like *Atya armata.*

Recently I have collected atyas from a mountain stream near Manila and have obtained a series similar to that of von Martens's. The largest males agree very well with the description of *Atya armata* except that the lower margin of the rostrum is toothed, a fact which has been observed by Bouvier. In a series arranged according to the body length, the third legs grade in size from a condition found in the largest males, where they are much larger than the fourth and fifth legs, to a condition found in the small males, where they are of about the same size as the fourth and fifth legs. The graded reduction in the size of the spine on the merus of the third legs is evident in this series in passing from the old males to the younger males. Before having seen von Martens's paper, I had come to the conclusion that I was dealing with the young and old of the same species, which increases the value of my confirmation of von Martens's observation.

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[1] *Arch. f. Naturgeschichte* (1868), 34. 47.

[2] *Ann. Soc. ent. France* (1864), 33. 47.

The exceptionally large third legs are characteristic only of the old males in our specimens. In the females the third legs are always a little larger than the fourth and fifth, but they never approach the size found in the large males. Furthermore the large heavy spine is not present in the females, but in its place there are the slender acute spines similar to the ones which are found in the young males.

A comparison of 7 specimens, the largest 70 millimeters and the smallest 25 millimeters in length, shows interesting gradations in the size and character of the spines on the third, fourth, and fifth legs.

Specimen 1 (museum No. 1380) is an old male, 70 millimeters in length, with 3 teeth on the ventral border of the rostrum. The right third leg has a large immovable spine on the ventrolateral surface of the merus near the distal end. The merus of the right fourth leg has 1 slender movable spine almost ventral in position and near the distal end. The merus of the right fifth leg has 2 slender movable spines which are ventral in position, one being near the distal end and the other at about the middle. The conditions are similar for the left legs, except that on the merus of the fifth leg there is no spine in the middle region (fig. 1, *a*, *b*, *c*).

Specimen 2 (museum No. 1371) is a slightly younger male, 56 millimeters long, with 5 teeth on the ventral border of the rostrum. The merus of the right third leg has 1 large immovable spine, smaller than the spine in specimen 1, on the ventrolateral surface near the distal end. The merus of the fourth leg has 2 slender movable spines, one near the distal end and the other about one third of the length of the merus posterior to the distal end. The merus of the fifth leg shows 3 slender movable spines, the most posterior being two thirds of the length of the merus posterior to the distal end. The conditions are similar for the left legs (fig. 1, *d*, *e*, *f*).

Specimen 3 (museum No. 1371) is 58 millimeters long and has 4 teeth on the ventral border of the rostrum. Although this specimen is 2 millimeters longer than specimen 2, its third legs are not so heavy, and I consider it to be less mature. The merus of the right third leg bears 2 spines—a heavy immovable one in the usual position but smaller than that of No. 2 and a slender slightly movable one anterior to it. This slender spine seems to correspond to the one Milne Edwards described for the type of *Atya armata*. The merus of the right fourth leg bears 3 movable spines, the most posterior of which is situated at about the middle of the length of the merus. The merus of the right fifth leg has 2 movable spines. Similar conditions are found in the left legs, except that the merus of the fifth leg bears 3 movable spines (fig. 1, *g, h, i, j*).

Specimen 4 (museum No. 1371) is 56 millimeters long, and I consider it to be less mature than any of the specimens already mentioned. It has 6 teeth on the lower border of the rostrum. The merus of the right third leg has 2 sharp movable spines (the most distal one is only slightly movable) and a swelling between the two, the latter indicating the beginning of the heavy spine of older specimens. The merus of the right fourth leg has 4 slender movable spines, and the merus of the fifth legs bears 3 movable spines. The conditions are similar for the left legs (fig. 1, *k, l, m*).

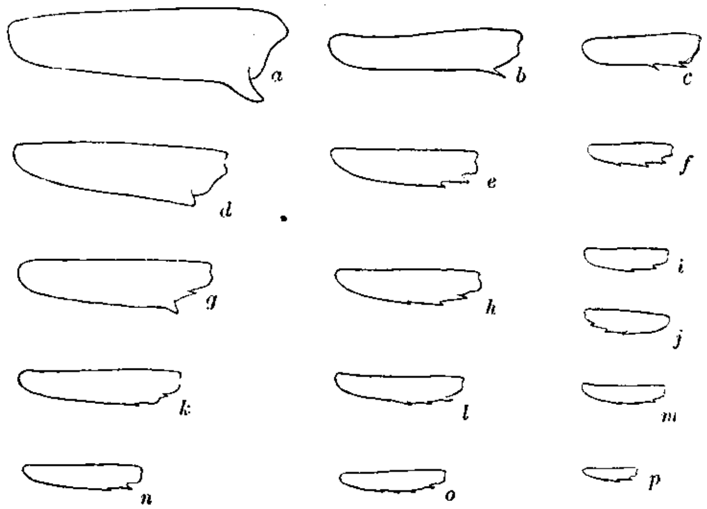

FIG. 1. *Atya molluccensis* de Haan. *a, b, c*, specimen 1, meri of the right third, fourth, and fifth legs, respectively; *d, e, f*, specimen 2, meri of the right third, fourth, and fifth legs, respectively; *g, h, i*, specimen 3, meri of the right third, fourth, and fifth legs, respectively; *j*, specimen 3, merus of the left fifth leg; *k, l, m*, specimen 4, meri of the right third, fourth, and fifth legs, respectively; *n, o, p*, specimen 5, meri of the right third, fourth, and fifth legs, respectively.

Specimen 5 (museum No. 1371) has 6 teeth on the lower border of the rostrum and is 42 millimeters long. There are 2 movable spines on the merus of the right third leg, 4 movable spines on

ILLUSTRATION

TEXT FIGURE

FIG. 1. *Atya molluccensis* de Haan.

a, b, c, specimen 1, meri of the right third, fourth, and fifth legs, respectively; *d, e, f,* specimen 2, meri of the right third, fourth, and fifth legs, respectively; *g, h, i,* specimen 3, meri of the right third, fourth, and fifth legs respectively; *j,* specimen 3, merus of the left fifth leg; *k, l, m,* specimen 4, meri of the right third, fourth, and fifth legs, respectively; *n, o, p,* specimen 5, meri of the right third, fourth, and fifth legs, respectively.

NOTES ON PHILIPPINE ALCYONARIA

PART IV: NOTES ON PHILIPPINE STOLONIFERA AND XENIIDÆ

By S. F. LIGHT
(From the Zoölogical Laboratory, College of Liberal Arts, University of the Philippines)

While the littoral alcyonarian faunæ of Zanzibar, Ternate, Amboina, and of the Maldive and Laccadive Archipelagoes have been studied by well-known scientists—Kükenthal, Hickson, Schenk, May, Thomson and Henderson, and others—the remarkably rich and varied fauna of the numberless shallow-water coral reefs of the Philippine Archipelago seems almost entirely to have been neglected. With the exception of the few littoral specimens collected by the *Challenger* expedition at Mactan Island, near Cebu, and at Zamboanga, Mindanao,[1] and a few specimens collected by Sanderson, Jagor, and Müller,[2] the shallow-reef *Alcyonaria* of the Philippine Islands have been practically untouched. The *Alcyonaria* collected by the United States Bureau of Fisheries steamer *Albatross* in Philippine waters have not been reported on, but it is to be expected that they will be mainly deep-sea or deep-littoral forms.

It is not strange, therefore, that we find but two species of the suborder Stolonifera recorded from the Philippines: *Tubipora musica* Linnæus, recorded by Wright and Studer[1] from Zamboanga, and *Clavularia inflata* Schenk var. *luzoniana* May, reported by May[2] from Albay Province, Luzon.

The alcyonarian collection of the University of the Philippines is made up of *Alcyonaria* collected on the joint scientific expeditions of the University of the Philippines and the Philippine Bureau of Science to Port Galera Bay on the northern coast of Mindoro and to Taytay Bay on the east coast of Palawan, of many specimens collected by Griffin and Wharton in the Bantayan Islands off the northwest coast of Cebu, of a large number of specimens from the interisland cables in various localities and at depths of from 20 to 300 meters collected by Day and Light, and of a few specimens from Mariveles at the mouth of Manila Bay. This collection contains a large series of specimens of Stolonifera and Xeniidæ from these widely separated localities, and gives a very good idea of the relative abundance and distribution of the species of these groups in the Islands.

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[1] Wright, E. P., and Studer, Th., Report on the Alcyonaria collected by H. M. S. Challenger during the years 1873–87. The voyage of H. M. S. Challenger, Zoology. London (1889), 31, v–lxxii + 1–314, Pls. I–XLII.

[2] May, S. J., Beiträge zur Systematik der Alcyonaceen, *Jena. Zeitschr. f. Naturw.* (1899), 33.

Although dredging has been carried on by various expeditions in the waters of the Philippines, no species of deep-sea or deep-littoral Stolonifera or Xeniidæ has been reported from the Islands, and all the specimens in our collection, with two exceptions, are from shallow-water reefs. One of these exceptions is a small species of *Cornularia* with minute polyps and a perisarclike horny covering on the basal portion of the polyps and on the stolons. It was found growing on a large colony of *Siphonogorgia variabilis* Hickson taken from a cable at a depth of 90 meters. The other is a specimen from a cable at a depth of from 20 to 100 meters, and is probably an undescribed species of *Cespitularia*.

While on the collecting expeditions mentioned I had excellent opportunities for observing the Philippine species of Stolonifera and Xeniidæ in their habitat. One cannot but be impressed by the flowerlike beauty of the large distinct polyps of *Anthelia* and *Xenia*. With their beautiful iridescent shades of blue and green or rich velvety brown, their gracefully flexible polyps waving with the currents, and their slender featherlike tentacles they present a picture of unusual grace and charm. The smaller, shorter, and more rigid starlike distal moieties of *Tubipora*, or of *Clavularia violacea* Quoy and Gaimard with their solid green, blue, or light velvety brown colors, present a decidedly different appearance, but one as distinctly pleasing; and the sudden change, which takes place when the colony, disturbed by some sudden jar or by a shadow, suddenly retracts the distal moieties of its polyps, exposing the red expanse of the rest of the colony, is very startling. Preserved specimens lack much of this beauty of form and color, but they are still among the most beautiful specimens of a collection. The difference in appearance in preserved pieces from the same colony is often so great that one might easily believe that they were specimens of different species. Studies of these forms carried on in their habitats and accompanied by colored drawings of the living colonies and by figures of polyps or entire colonies killed in contraction and of others killed in expansion would be of great value in putting the classification of the species of these genera on a more secure and scientific basis. I have found that fully expanded specimens may be obtained best by allowing them to expand in aquaria and adding magnesium sulphate a little at a time until they are so anæsthetized as to cease to respond to stimuli, after which they may be placed in the preserving fluid. Most of our specimens are preserved in from 4 to 10 per cent formalin and remain much more flexible and keep their color longer than those preserved in alcohol. However, some specimens which have been in formalin for a number of years are beginning to show signs of degeneration, and alcohol seems to be a better preservative for museum specimens.

Our collection contains species belonging to each of the four clearly defined and well-known genera of the Cornulariidæ: namely, *Cornularia* Lamarck, *Anthelia* Savigny, *Clavularia* Quoy and Gaimard, and *Sympodium* Ehrenberg. I follow Kükenthal[3] in retaining the well-defined and distinct genus *Anthelia* and in dropping the generic name *Rhizoxenia* for which Müller has recently tried to make a case.[4] The type species, *R. thalassantha,* judging from Lesson's description[5] and from Haeckel's figures,[6] is undoubtedly a species of *Clavularia.* This makes it necessary to drop the name *Rhizoxenia,* and if the genus is still retained it must be given Philippi's name *Evagora,*[7] first used for *E. rosea* (*R. rosea* of Dana, von Koch, and others). If the genus is not retained, those of its species whose polyps are entirely retractile will fall within the genus *Sympodium;* and those whose polyps have a distal moiety retractile within a proximal moiety, within the genus *Clavularia.* It also seems best, as Schenk[8] has pointed out, to consider *Stereosoma celebense* Hickson[9] as a species of *Anthelia* in order to prevent the possibility of a recurrence of such a confusion of genera as has until recently existed in the family Cornulariidæ. Hickson's arrangement of the genera of the Cornulariidæ[10] in which he places *Cornularia* and *Stereosoma* in a separate family, the Cornulariidæ, characterized by their lack of spicules and presumably, although he does not mention it, by the horny secretion common to both, seems to me to be essentially artificial, as the absence of spicules is not a safe diagnostic character in this instance—I have a species of *Anthelia* which is without spicules and one is mentioned by May—and further, the horny secretion seems to be of a different nature, position, and perhaps origin in the two species involved.

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[3] Kükenthal, W., Die Stammesgeschichte und die geographische Verbreitung der Alcyonaceen, *Verhandl. d. deutsch. Zool. Ges.* (1906), 138.

[4] Über die Alcyonaceen-Gattung *Rhizoxenia* Ehrenberg, *Mitt. a. d. Zool. Stat. zu Neapel* (1910), 20, 94–99.

[5] I have not had access to Lesson's work, but the important part of his description is given by Müller in footnote 1, p. 94, of the volume cited above.

[6] Arabische Korallen. Berlin (1875).

[7] Zoologische Beobachtungen, *Arch. f. Naturg.* (1842), 8, 33–45.

[8] Clavulariiden, Xeniiden, und Alcyoniden von Ternate, *Abhandl. d. Senkkenb. naturf. Ges.* (1896), 23, pt. 1.

[9] *Trans. Zool. Soc. London* (1895), 13.

[10] The Cambridge Natural History, Coelenterata and Ctenophora (1906), 1.

I have recently received a specimen of *Cornulariella modesta* Verrill in exchange from the United States National Museum. From an examination of this specimen I can confirm Hickson's decision that while this species is, no doubt, distinctly different from the other known species of *Clavularia*, it agrees with them in generic characters and shows no other distinctive characters which would justify its separation to form the genus *Cornulariella*.

The genus *Anthelia* is the most abundant genus of the Cornulariidæ found on the reefs of the Philippines. It is especially abundant in inclosed bays, such as the one at Port Galera, Mindoro, where it is present on all the shallower parts of the reefs. It forms incrusting growths over dead coral, débris, stones, and on the hard sand bottom. We have one specimen carried on the back of a *Dromia*-like crab, which it entirely covers in much the same way as the sponge does the closely related *Cryptodromia tuberculata* Stimpson as described by Cowles.[11] The commonest species agrees very well with *Anthelia fuliginosa* (Ehrbg.) Kükenthal.[12] We have a large series of specimens of this very variable species preserved in formalin, showing all the forms mentioned by Kükenthal, including the "*sympodium purpurascens*" form which seems distinct enough to be considered a separate species. In life *A. fuliginosa* is rich velvety brown or brownish green, the color being due, as in most reef *Alcyonaria*, to the presence in the endoderm of large numbers of symbiotic unicellular algæ of the *Zoöxanthella* type. The long flexible polyps with slender, extended, and constantly moving tentacles have a strikingly flowerlike appearance. *Anthelia fuliginosa* is common in the Red Sea, and according to Kükenthal [12] is the only species of the genus to be found there. May has reported it from Zanzibar,[13] and its wide distribution in the

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[11] Cowles, R. P., The habits of some tropical Crustacea, *This Journal, Sec. D* (1913), **8**, 119.

[12] Über einige Korallenthiere des Rothen Meeres. Festschrift zum siebzigsten Geburtstag von Ernst Haeckel, *Denks. Med. Natur. Ges., Jena* (1904), **11**, 43.

[13] *Jena. Zeitschr. f. Naturw.* (1899), **33**.

Philippines—we have specimens from Mindoro and Palawan—makes it the most widely distributed and commonest species of the genus. Undoubtedly it will be found to be a common species in the other islands of the East Indies if, indeed, it has not already been described from those regions under another name.

The three or four other species of the genus in our collection are each represented by but a few specimens, and some or all of them are probably new to science. One is interesting in that it appears to be similar to *Rhizoxenia primula* Dana,[14] but the polyps are connected by a slender creeping stolon attached to a piece of dead *Millepora*. It seems very probable, as Dana himself suspected, that such a stolon existed in his specimen, but was overlooked when the drawing was made. Another beautifully expanded specimen agrees very closely with May's *Clavularia longissima* which is, of course, a species of *Anthelia*.

Next in number of species and in distribution in the Philippines is the genus *Clavularia* Quoy and Gaimard, of which there are specimens of 3 or more species in our collection. Conspicuous among these are numerous specimens of *Clavularia* (*Hicksonia*) *viridis* Quoy and Gaimard. This, as Hickson predicted,[15] is one of the common, it not the commonest species of *Clavularia* on our reefs. Its habits agree exactly with those given by Hickson for the same species in Celebes. Kükenthal[16] speaks of this species under the names *Anthelia celebensis* and *Anthelia viridis*. This is probably to be accounted for by Hickson's misleading statement "in habit it (*Clavularia celebensis*) is very similar to *C. viridis*." The species described by Hickson as *Clavularia celebensis* must be considered as a species of *Anthelia*, but the species described and figured by Quoy and Gaimard[17] and by Hickson as *Clavularia viridis* is distinctly different, and since it has polyps whose distal portions are retractile within their proximal portions it is a species of *Clavularia*, unless the facts that the stolons originate at different heights on the polyps and that it has a horny skeleton be considered sufficient to place it in a separate genus (*Hicksonia*).[18]

A careful investigation of the anatomy of *Clavularia viridis* would undoubtedly add many interesting facts to our knowledge of the finer structure of the *Alcyonaria.* A brief study of sections stained with iron hæmatoxylin has brought out several points of interest. The walls of the stomodæum are composed of the usual columnar epithelium cells—very long and slender and containing elongated, deeply staining nuclei so arranged as to give the appearance of pseudo-stratified epithelium. Scattered among these cells are large gland cells containing a varying amount of deeply staining granules. These cells are slender distally and often entirely filled in their outer portions at least with the glandular products, and I have been unable to make out any nucleus in the outer portion. Lying between the epithelial layer and the mesoglœa is an irregular layer made up of the large, broadly oval bases of the cells with centrally placed, spherical, lightly staining nuclei, the membrane and a minute central nucleolus of which are the only parts which take the stain. It is very difficult to make out a connection between this basal portion and the outer spindle-shaped glandular portion, but I have been able to do so in a number of cases. The granular material of the outer portion of these cells takes an intense blue-black stain in Heidenhein's iron hæmatoxylin, and in a few instances I have found these cells discharging their contents into the stomodæal cavity. Ashworth[19] has noted gland cells in the stomodæal walls of *Xenia* and explains their presence as being due to the absence of mesenterial filaments and the consequent necessity for the assumption of the digestive function by the stomodæum. I have found these gland cells to be present, however, in the stomodæal walls of *Cornularia minuta,*[20] *Lithophytum rigidum,* and *L. philippinensis;*[21] in *Capnella ramosa* and *C. philippinensis;*[22] and even in the genera *Lemnalia* and *Lemnalioides,*[23] where the mesenterial filaments are remarkably long, reaching to the base of the colony.

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[14] Dana, J. A., United States exploring expedition during the years 1838, 1839, 1840, 1841, 1842, under the command of Charles Wilkes, U. S. N. Atlas. Zoophytes. Philadelphia (1849).

[15] *Trans. Zool. Soc. London* (1895), **13**.

[16] *Verhandl. d. deutsch. Zool. Ges.* (1906), 142.

[17] Zoologie du Voyage de l'Astrolabe (1834).

[18] Delage and Herouard, Les Coelentères. Traité de Zoologie concrète. Paris (1901), **3**.

Scattered at more or less regular intervals in the inner portion of the stomodæal wall are numerous short oval cells, each containing an oval nematocyst about 0.009 millimeter in length with a spirally coiled thread. The nematocyst seems to crowd the cell, and the nucleus fits over its inner end like a cap. The nuclei of these cells are at about the same level and form a more or less regular row beyond the nuclei of the epithelial cells. So far as I have been able to ascertain, this is the first alcyonarian in which nematocysts have been found in the stomodæal walls. It is probable that its large size allows *C. viridis* to ingest fair-sized living animals which are killed by the discharge of nematocysts, preliminary to being digested in the stomodæum by the products of the gland cells already described.

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[19] Xeniidæ, Willey's Zool. Res. (1900), **4**, 68.

[20] Light, S. F., Notes on Philippine Alcyonaria, part V: Cornularia minuta sp. nov., *This Journal, Sec. D* (1915), **10**, No. 3.

[21] Ibid. (1915), **10**, No. 3.

[22] Ibid. (1913), **8**, 435.

[23] Ibid. (1914), **9**, 233.

The cells of the siphonoglyphe, which is very distinct, are extremely long and slender with very long, slender, rod-shaped nuclei.

As Hickson[24] has pointed out the muscular ridges of the mesenteries are very numerous and long. In my experience *C. viridis* is only second in this regard to *C. violacea* Quoy and Gaimard, in which the muscle banners are enormously developed.

Hickson[24] speaks of the horny skeletal elements of *C. viridis* as being present in wide lacunæ in the mesoglœa and figures them there in section as deeply staining bodies. In his figure the spaces are much smaller in proportion to the size of the central bodies than in my specimens. Indeed, after studying an extensive series of sections, I am convinced that the structures which Hickson figured as skeletal elements are merely the nuclei of spicule-forming cells. The true skeletal fibers are to be found in the ectoderm, appearing in sections as deeply staining crescents averaging 0.01 millimeter in length and 0.003 millimeter in greatest diameter. In a few instances these bodies are found in the edge of the mesoglœa, in which case they are always associated with large cells evidently amœboid in character and characterized by a very distinctly reticulated cytoplasm, a small central nucleus with a number of chromatin centers, and a few deeply staining granules in the cytoplasm. Further study may show these cells to be the skeleton-producing cells.

Another striking and widely distributed Philippine species of *Clavularia* is *Clavularia violacea* Quoy and Gaimard.[25] We have numerous specimens of this from Mindoro and Palawan and single specimens from Bantayan and from Mariveles. The red of the proximal portions of the polyp and of the base and the brillant green of its distal moieties make it a very conspicuous reef alcyonarian. The distal moieties of the polyps have about the same color, size, and shape as those parts in *Tubipora,* which is common in the same habitat, and the colonies of one genus are easily mistaken for those of the other when seen at a distance.

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[24] *Trans. Zool. Soc. London* (1895), 13.

[25] Zoologie du Voyage de l'Astrolabe (1834).

This very interesting alcyonarian is here reported for the first time since Quoy and Gaimard reported it from Vanokoro in 1834. Among their figures are an oral view of a polyp and a view of the cut surface of a contracted polyp cut in half longitudinally. A brief study of the numerous specimens in our collection has shown several errors made by Quoy and Gaimard in their rather superficial study of the polyp. In their figure of the oral view of the polyp they show no pinnules on the tentacles. An examination of a number of specimens both externally and in sections has shown that they were correct in this observation, the tentacles showing no vestiges of pinnules. In the drawing of the half polyp, however, the tentacles are figured as being completely introverted and appear to have numerous pinnules, and a high conical hypostome is shown on the oral surface. A superficial examination of a contracted polyp cut in two longitudinally gives much the same impression as the drawing of Quoy and Gaimard, but a more careful investigation shows that the yellow mass below the oral surface is composed of the mesenteries, which are thickened at that point and surround the central stomodæum. The conical hypostome of Quoy and Gaimard resolves itself into the contracted tentacles, which form a conical mass just above the oral surface.

The absence of any vestige of pinnules makes this a very remarkable form, and there are many other equally interesting characters which would well repay a detailed investigation. Some of these are: The presence of a reticulated mesoglœa containing besides spicules large canals lined with ectodermal cells which contain a few unicellular algæ; the presence of an external cuticle; the presence in the distal moiety of an ectoderm of very high columnar epithelium strikingly different from that of any other known alcyonarian; the presence near the junction of the proximal and distal moieties between the ectoderm and the true mesoglœa of a reticulum composed of outgrowths from the mesoglœa in whose meshes lie small irregular-shaped ectoderm cells; and lastly the enormous development of the muscular ridges of the mesenteries and the peculiar structure of the swollen, upper portion of the mesenteries in which the mesoglœa is finely reticulated and contains numerous symmetrically placed, deeply staining, irregular-shaped bodies.

The finer anatomy of *Clavularia viridis* and *C. violacea* is a fascinating subject, and I hope at some time to be able to take it up more fully. A third species of *Clavularia* seems to be rather variable in form and size, and will probably be found to be Schenk's *Clavularia inflata.*[26] Some specimens agree with May's *C. inflata* var. *luzoniana.*[27] This is the only species of *Clavularia* reported from the Philippines. May[27] reports it from Albay Province, Luzon, and we have specimens from Bantayan Island, Mindoro Island, and Mariveles, Luzon. A few other specimens may prove to belong to a new species of the genus.

To the genus *Sympodium* I am assigning a number of incrusting colonies which have *Xenia*-like but retractile polyps and numerous small disk-shaped spicules. With one exception they were found growing on the branches of dead *Madrepora.* They will probably prove to belong to two or three new species. I recall finding on one of the reefs near Taytay, Palawan, a small pocket or hole, somewhat deeper than the remainder of the reef and just inside the growing edge, which was filled with a mass of branches of dead *Madrepora.* Growing on the branches and connected by ribbonlike stolons were hundreds of colonies of what appeared to be a species of *Xenia,* ashy gray in color. On collecting them, I found that the fleshy stalk characteristic of *Xenia* was replaced by an incrusting membranous base into which the polyps were entirely retracted when disturbed. It is colonies of this type which I consider to belong to the genus *Sympodium* now that the older species have been removed to the genus *Alcyonium* where they more properly belong. It is interesting to note how much more closely the polyps of these species resemble those of *Xenia* in color, in the size and arrangement of the pinnules, and in the general appearance in both living and preserved specimens than they do those of *Anthelia* to which they would seem to be more closely related.

The only species of *Cornularia* in the collection, and the first to be reported from Asiatic waters, is the small form spoken of before as having been found growing on colonies of *Siphonogorgia variabilis* Hickson from the cable in Albay Bay at a depth of 90 meters. The minute size of this form—the polyps are not more than 2.5 millimeters in height when fully expanded and the stolons are threadlike—and the peculiar thin horny covering of the lower portions of the polyps and of the stolons, which has a striking resemblance, particularly in sections, to the perisarc of many hydroids, make it certain that this is a new species of this very interesting genus. I am having sections made and shall make a report on the structure of the form in the near future.

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[26] *Abhandl. d. Senckenb. naturf. Ges.* (1896), 23, pt. 1.

[27] *Jena. Zeitschr. f. Naturw.* (1899), 33.

Tubipora, probably belonging to the single species *T. chamissons* Ehrbg. as Hickson [28] believes, is common on all the reefs of the Philippines which I have visited and has been reported from Zamboanga by Wright and Studer.[29] In the Philippines it is, as Crossland [30] reports from Zanzibar, "abundant wherever coral grows." Philippine specimens show three distinct color varieties, in one of which the distal moieties of the polyps are pale blue, in another bright green, and in the third light velvety brown, and many variations as to the length and diameter of the tubes are to be found.

The xeniid fauna of the Philippine reefs, particularly of the sheltered reefs, such as those in Port Galera Bay, Mindoro, and in the Bantayan Islands, is luxurious and varied. The species of this family and of the Cornulariidæ thrive in similar habitats, both being numerous at Port Galera Bay and Bantayan but strikingly scarce on the reefs of the eastern coast of Palawan. Why these reefs are unsuited for the growth of such forms is hard to say, unless it be because of their more exposed position. This hypothesis seems to be supported by the fact that the few colonies which were obtained in Palawan waters were found on the reefs to the landward side of Pabellones Island and of another small island in the bay. This does not seem to hold good, however, in the case of Sabong Cove, near Port Galera, Mindoro, which is exposed, and yet has a rich fauna in the genera *Clavularia* and *Xenia* and especially in the rarer genus *Cespitularia.*

Our collection contains species of each of the three genera of the family of Xeniidæ: namely, *Xenia* Savigny, *Cespitularia* Valenciennes, and *Heteroxenia* Kölliker. As elsewhere, the species of *Xenia* are more numerous than those of *Heteroxenia* and *Cespitularia,* although the species of the last-named genus are unusually abundant in Philippine waters.

We have a very large series of specimens of *Xenia* belonging to a number of species, some of which are no doubt new. The separation of the species of this genus presents great difficulties owing to the lack of fixed characters and the instability of such diagnostic characters as are used; for example, the number of rows of pinnules, as their shape and their relative size and positions differ to a great extent with the state of contraction of the colony when killed. The same difficulty is encountered in the genus *Anthelia.* Systematic work on the species of these genera should deal first with the living animals and then with the preserved specimens.

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[28] Alcyonaria of the Maldives, Fauna and geog. of the Maldive and Laccadive Archipelago, 2, pt. 1, 473–500.

[29] The voyage of H. M. S. Challenger, Zoology (1889), 31.

[30] Thomson and Henderson, Marine Fauna of Zanzibar etc. from collections made by Cyril Crossland, *Proc. Zool. Soc. London* (1906).

One colony of *Xenia* is of interest in that it consists of many small branched or single stalks bearing unusually small polyps. These stalks, which are scattered over the branches of a dead colony of *Seriatopora,* are connected by slender creeping stolons. A number of other specimens are very similar to *Xenia hicksoni* Ashworth,[31] and one resembles *Xenia rigida* May,[32] but shows no dimorphism.

The collection contains specimens of *Heteroxenia elisebethæ* Kölliker[33] from two localities which show the marked dimorphism maintained by Kölliker,[33] Bourne,[34] Ashworth,[31] and others, but denied by May,[32] Schenk,[35] Haacke,[36] Kükenthal,[37] and others. The number of siphonozooids is so great in proportion to the number of autozooids, their size is so uniform and so much less than that of the autozooids, and these conditions have been noted by so many independent workers for specimens from so many widely separated habitats that it seems hardly conceivable that we have here merely growing polyps. If they are only autozooids in different stages of development why should so many young polyps of the same age be found on the same colony and why should observers in so many different parts of the world and at different seasons of the year find them at the same stage of development as far as the tentacles are concerned and of the same average size? The fact that one can find at the edge of the capitulum series of young autozooids approximating in differing degree the size and form of the mature autozooids tends rather to strengthen the case for dimorphism than to weaken it, for were such developing autozooids never found we would be forced to believe either that such colonies had reached a maximum development or that the so-called siphonozooids were immature autozooids as Kükenthal, May, and Schenk contend.

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[31] Xeniidæ, Willey's Zool. Res. (1900), **4**, 68; and Xenia Hicksoni, nov. sp., *Quar. Journn. Roy. Micr. Soc.* (1891), n. s. **42**.

[32] *Jena. Zeitschr. f. Naturw.* (1899), **33**.

[33] Heteroxenia, *Fest. d. Physical. Med. Ges. in Würzburg* (1874), **13**.

[34] *Phil. Trans.* (1895).

[35] *Abhandl. d. Senckenb. naturf. Ges.* (1896), **23**, pt. 1.

[36] *Zool. Garten* (1886).

[37] Versuch einer Revision, etc. 9. Xeniiden. *Zool. Jahrb., Syst.* (1901), **17**.

One specimen, which may be simply a contracted specimen of *H. elisebethæ,* shows a strong resemblance to *Xenia rigida* of May,[38] which is a species of *Heteroxenia* as evidenced by its dimorphism.[39] Another specimen has a few siphonozooids similar to those of *H. elisebethæ,* crowded in the center of the capitulum, and autozooids whose distal moieties appear both externally and in section to be able to retract within the cavities of the proximal portions—that is, within the fleshy stalk. This character has been noted by Hickson in *H. capensis,*[39] but the other characters make it probable that we have here a new species of *Heteroxenia.*

In the genus *Cespitularia* we have a very interesting series of specimens belonging to several different species. They range from decidedly *Xenia*-like colonies, with long flexible polyps which have all the appearance of the polyps of the ordinary reef *Xenia,* the polyp-bearing portion of which, however, shows the characteristic branching of the genus, to decidedly treelike colonies with small polyps approaching in appearance the polyps of the Nephthyidæ and especially of the genus *Lithophytum.* Several specimens resemble very closely *Cespitularia coerulea* May. Another form has large delicate polyps, the tentacles of which can be folded in over the oral surface. Still another, a distinctly treelike colony from a cable at a depth of from 20 to 100 meters, has large polyps whose distal portions are retractile within the thin transparent proximal portions. A number of these forms will, no doubt, prove to be new to science.

It will be seen from the foregoing notes that the shallow coral reefs of the Philippines support an abundant and varied fauna in the families Cornulariidæ, Tubiporidæ, and Xeniidæ. As this has been shown to be the case in Ternate by Kükenthal[40] and Schenk,[41] in the Maldives[42] and the Celebes[43] by Hickson, in New Guinea and the near-by islands by Hickson and Hiles[44] and by Ashworth,[45] and in Zanzibar by Thomson and Henderson[46] and Crossland and May, it was to be expected that such a fauna would be found in the Philippines, where conditions are much the same as in these regions.

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[38] *Jena. Zeitschr. f. Naturw.* (1899), 33.

[39] Marine investigations in South Africa (1902), 1, 70.

[40] Alcyonaceen von Ternate, *Abhandl. d. Senckenb. naturf. Ges.* (1896), 23, pt. 1.

[41] Ibid. (1896), 23.

[42] Fauna and geog. Maldive and Laccadive Archipelago, 2, pt. 1.

[43] *Träns. Zool. Soc. London* (1895), 13.

[44] Willey's Zool. Res. (1900), 4, 66.

It is interesting, in conclusion, to note the striking similarity between the general littoral alcyonarian fauna of the Philippines and a region so distant as Zanzibar. Briefly stated, the most striking similarities are: The presence of *Tubipora* "wherever coral grows," the large number of species of *Lemnalia*,[47] the presence of *Paralemnalia thrysoides* (Ehrbg.) Kükenthal[48] and of a few common species of *Nephthya* and *Lithophytum*, the presence in considerable quantities of *Telesto* and *Coelogorgia*, the abundance of Xeniidæ and Cornulariidæ, and the "great masses of *Sclerophytum*."

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[45] Ibid., 68; and *Quart. Journ. Microscop. Sci.* (1899), n. s. 42.

[46] *Proc. Zool. Soc. London* (1906).

[47] A number of species now known to belong to the genus *Lemnalia* were at that time placed in the genus *Lithophytum*.

[48] This species, formerly placed in the genus *Lithophytum*, has been taken by Kükenthal as the type species of his new genus *Paralemnalia*. See Alcyonarien des Roten Meeres, Expedition S. M. Schiff "Pola" in das Rote Meer. *Zool. Ergeb.* (1913), 29, 1–33 (reprint).

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CONTENTS

Page.

TAYLOR, EDWARD H. New Species of Philippine Lizards........ 89

WHARTON, LAWRENCE D. The Eggs of Ascaris lumbricoides.. 111

BERNHAUER, MAX. Zur Staphylinidenfauna der Philippinen: VI. Beitrag zur Kenntnis der Indo-malayischen Fauna............ 117

GROUVELLE, A. Dryopidæ et Heteroceridæ des Philippines.... 131

BAKER, C. F. Notices of Certain Philippine Fulgoroidea, One Being of Economic Importance.. 137

COWLES, R. P. Are Atya spinipes Newport and Atya armata Milne Edwards Synonyms for Atya molluccensis De Haan?.... 147

LIGHT, S. F. Notes on Philippine Alcyonaria. Part IV: Notes on Philippine Stolonifera and Xeniidæ.................................... 155

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